

FIG. 1

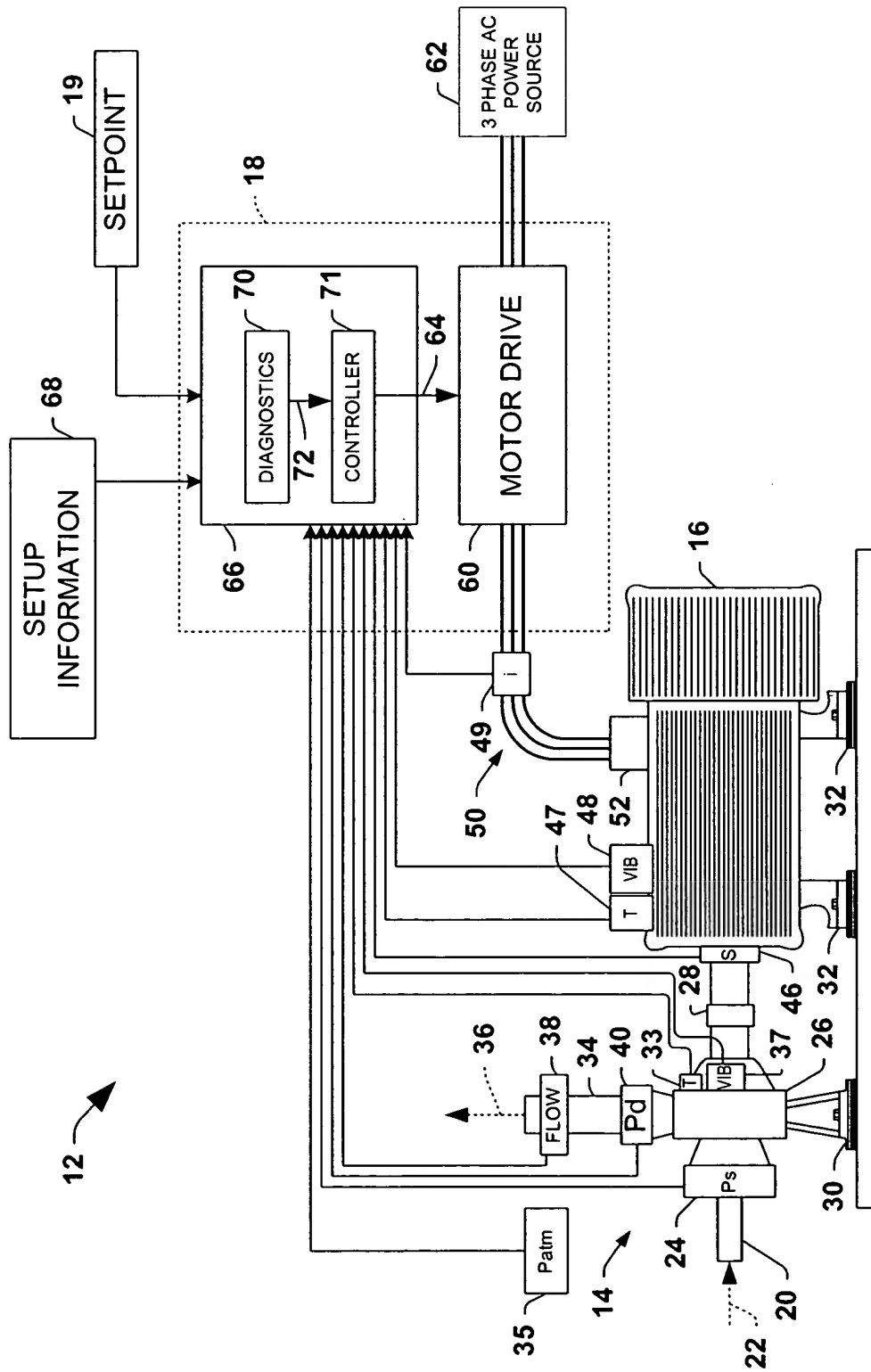


FIG. 2a

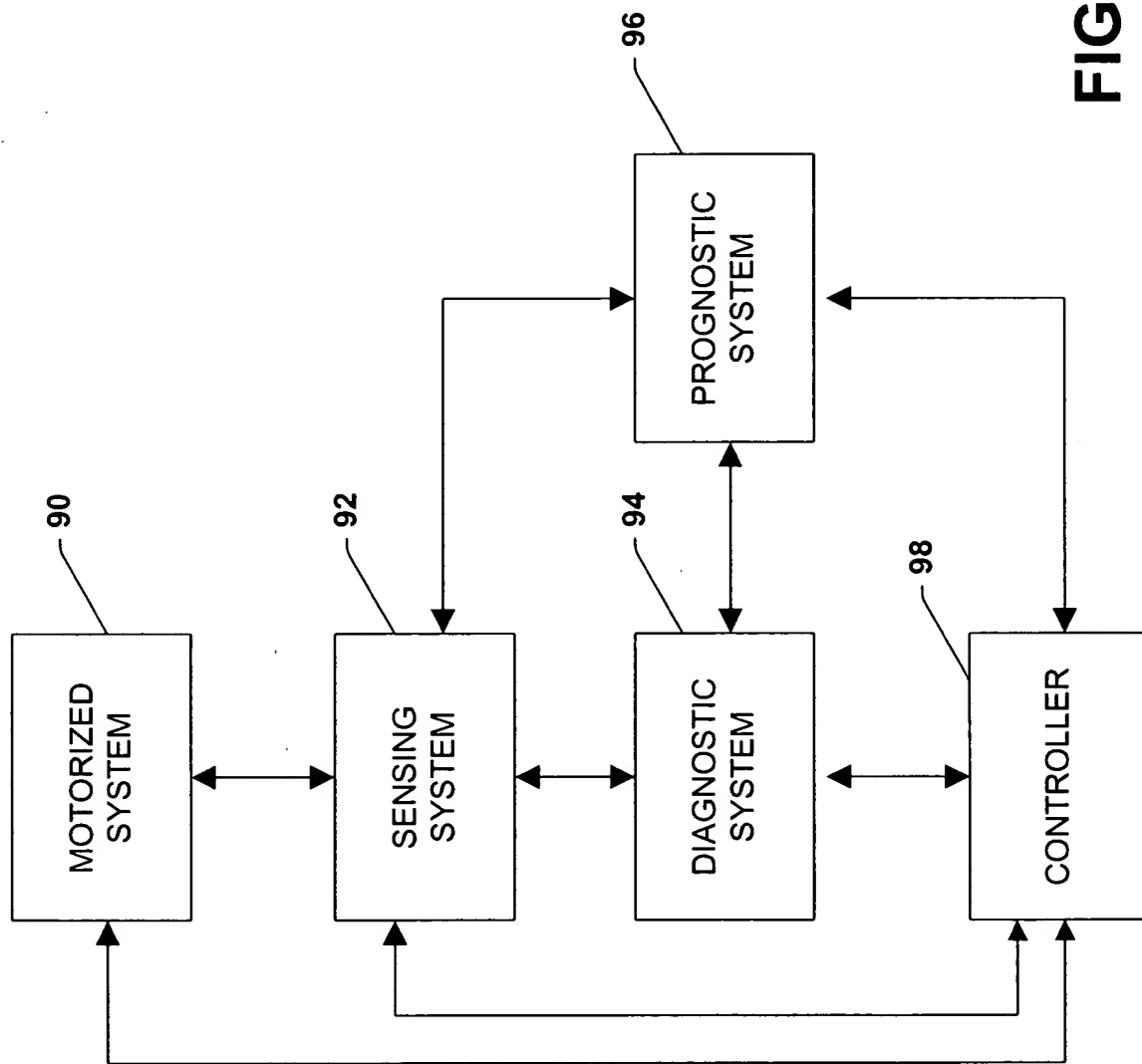


FIG. 2b

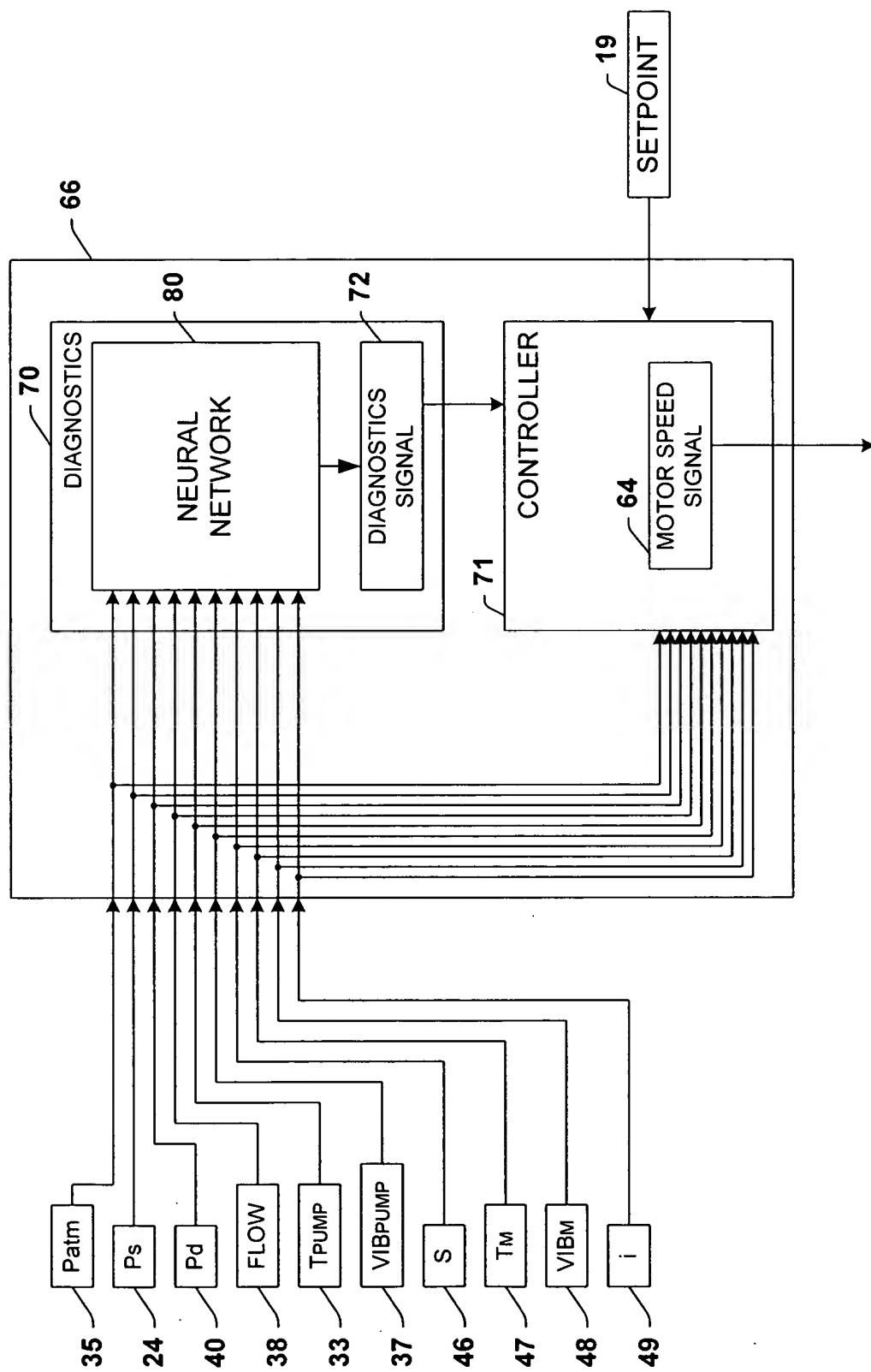


FIG. 3

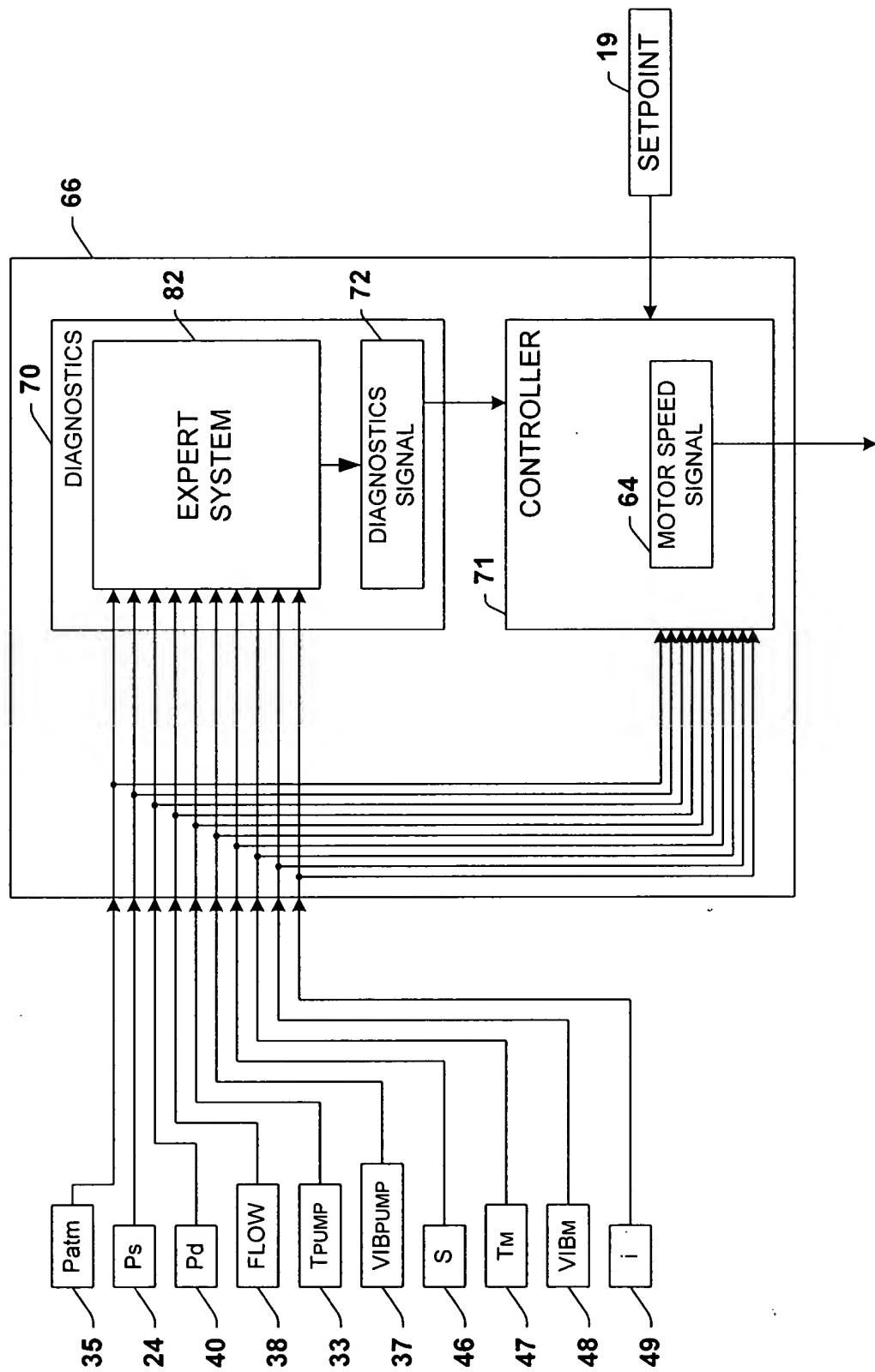


FIG. 4

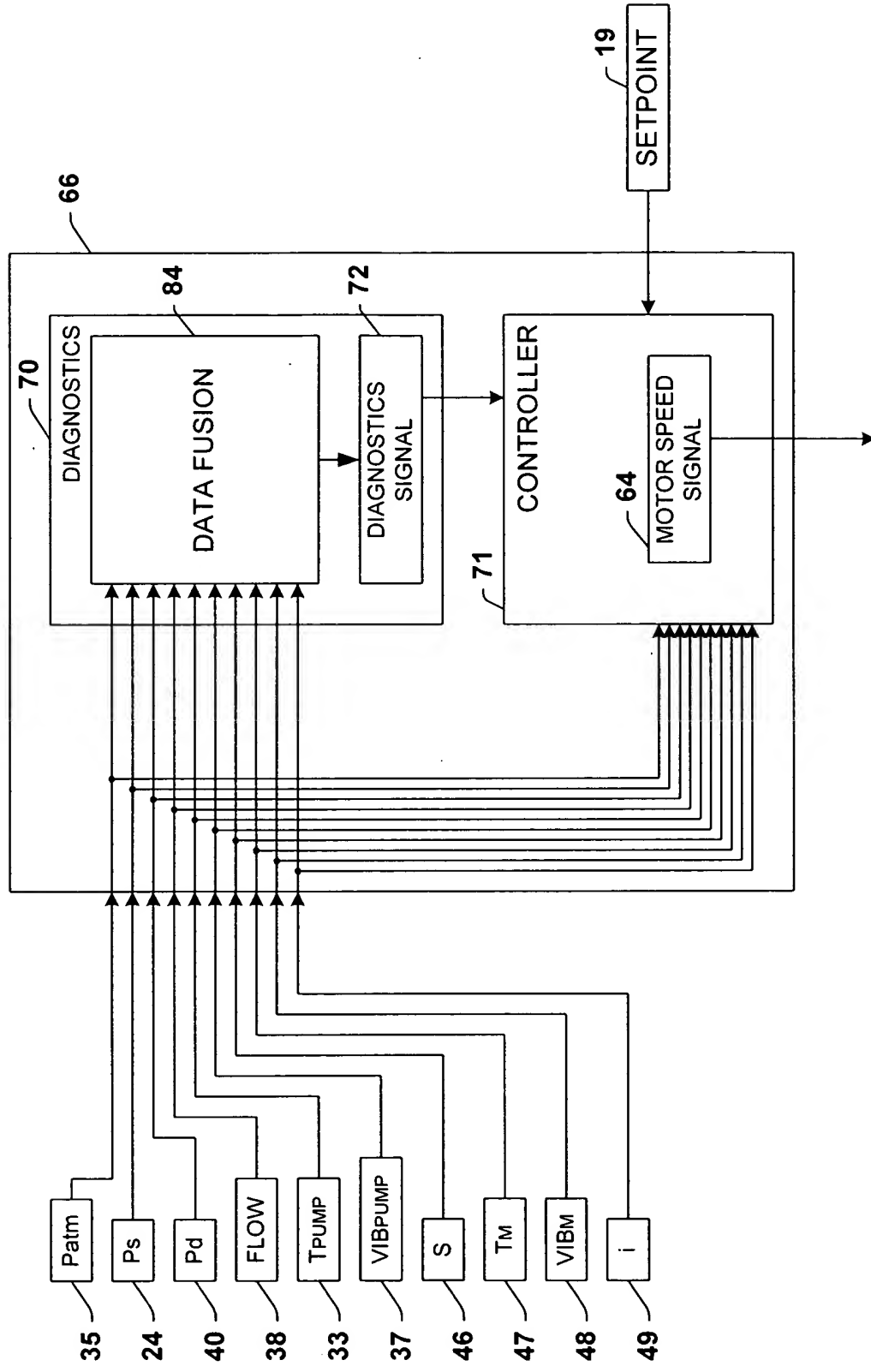
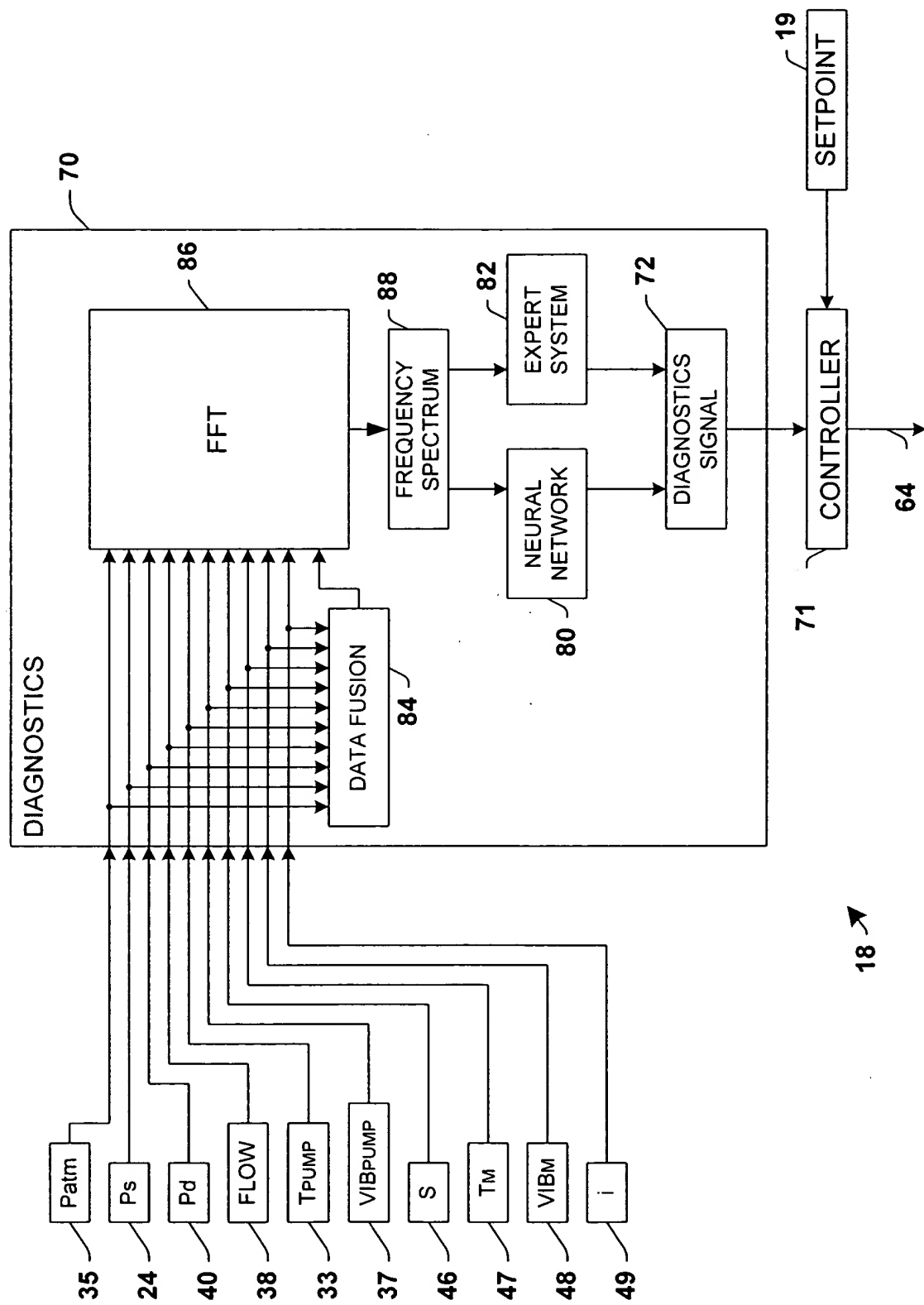


FIG. 5



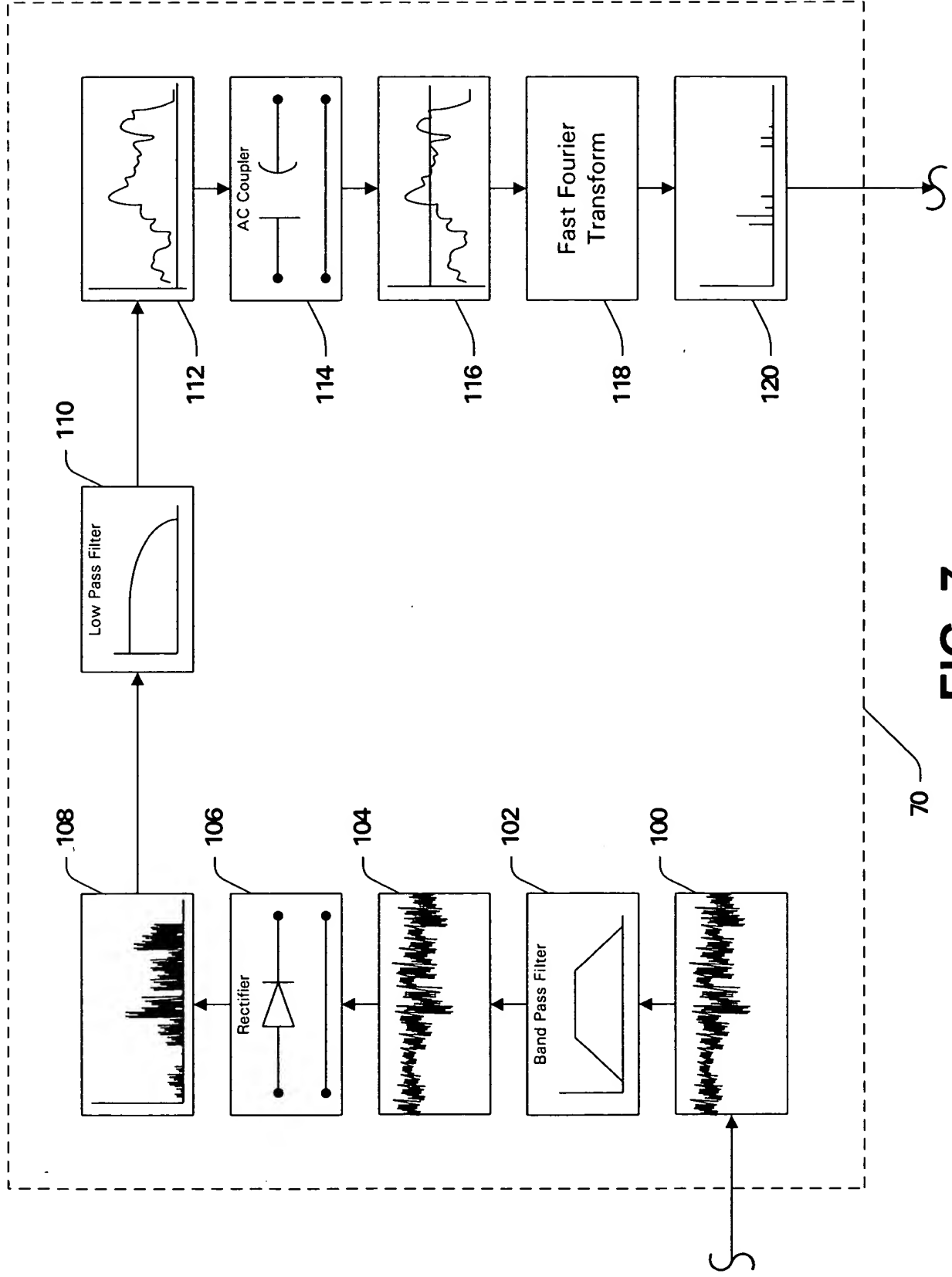


FIG. 7

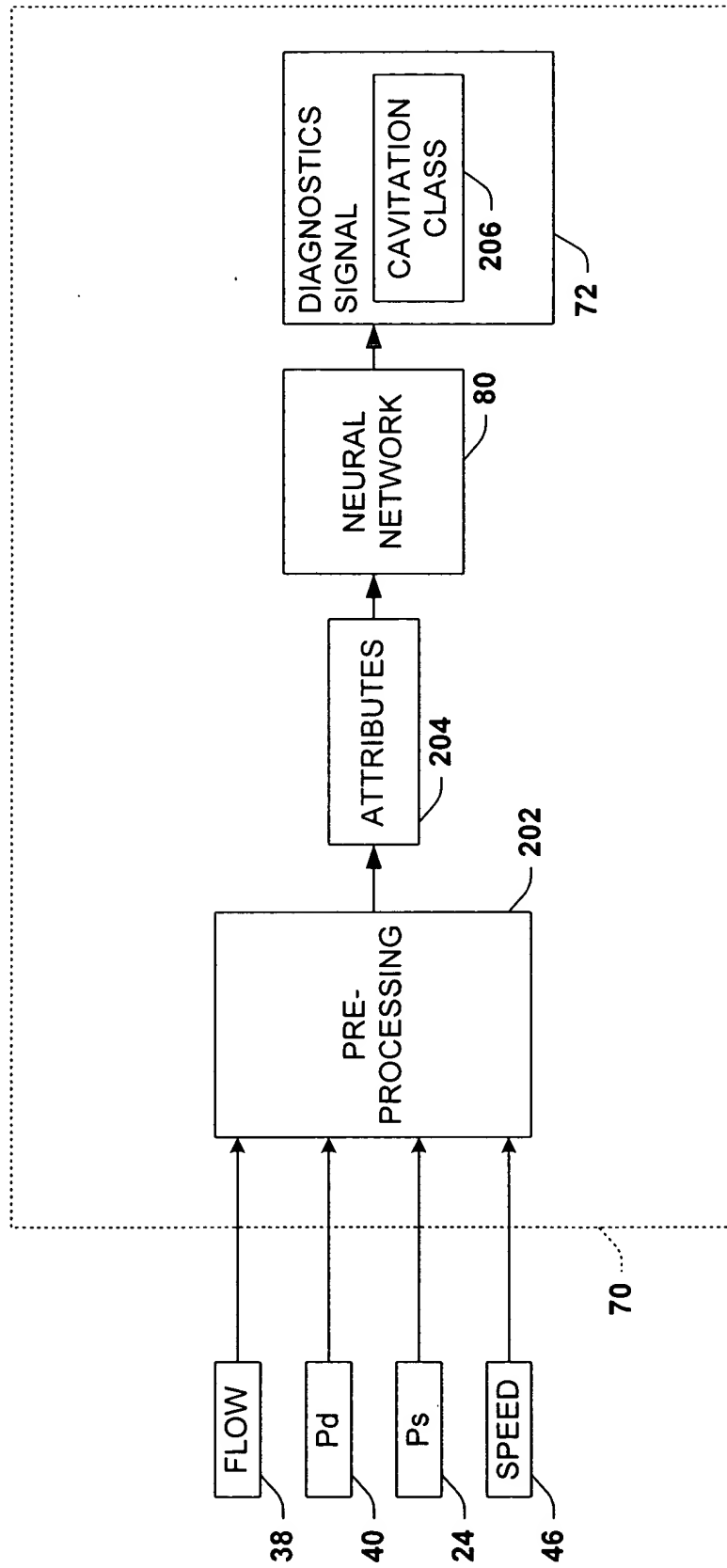


FIG. 8

DIAGNOSTICS SIGNAL	
CLASS 0	normal; no cavitation
CLASS 1	incipient cavitation; mainly balance hole cavitation
CLASS 2	medium cavitation; mainly vane cavitation
CLASS 3	full cavitation; large amount of bubbles on the suction eye but no surging
CLASS 4	surging cavitation; full blown cavitation with surging

206

72

FIG. 9

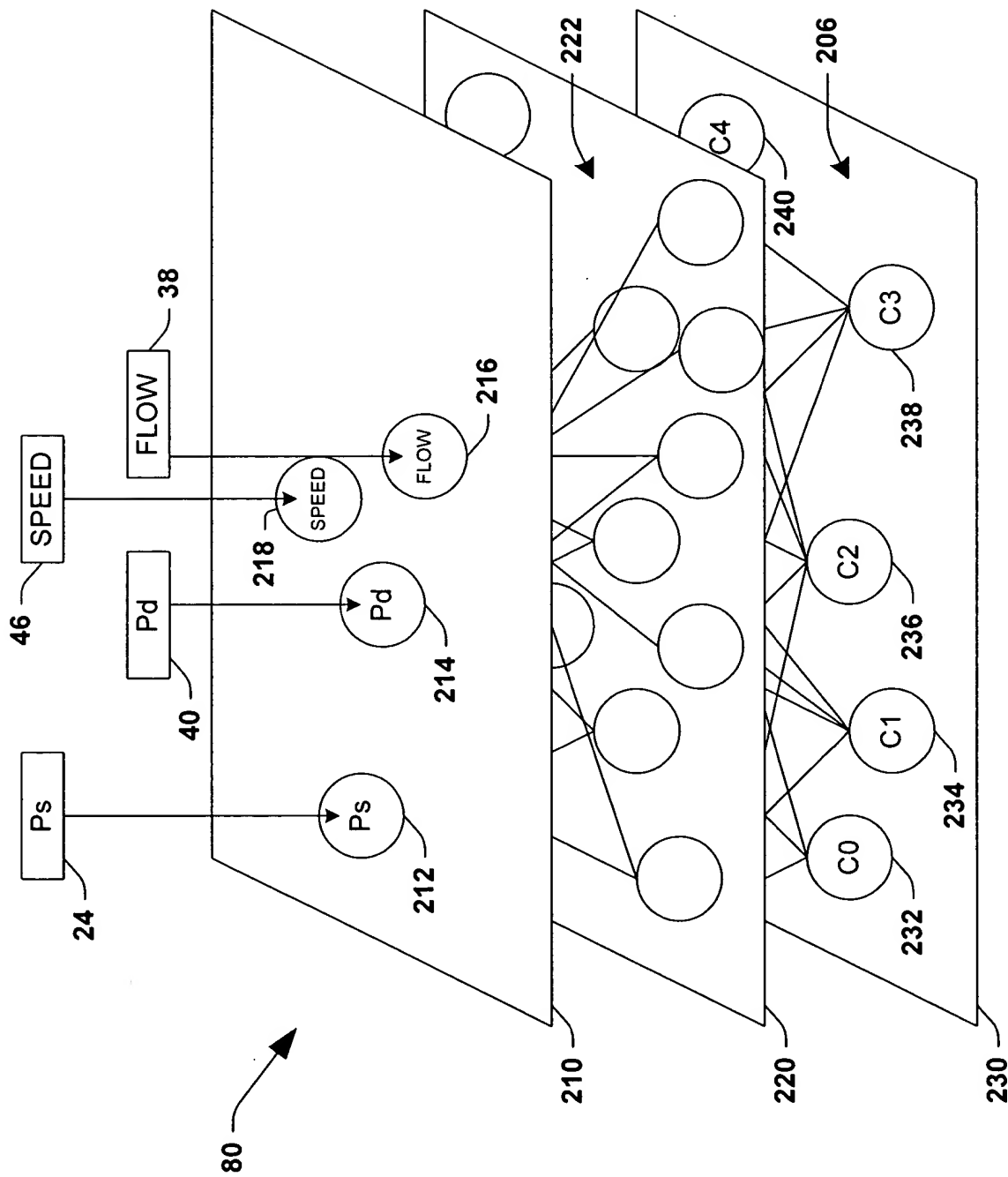


FIG. 10

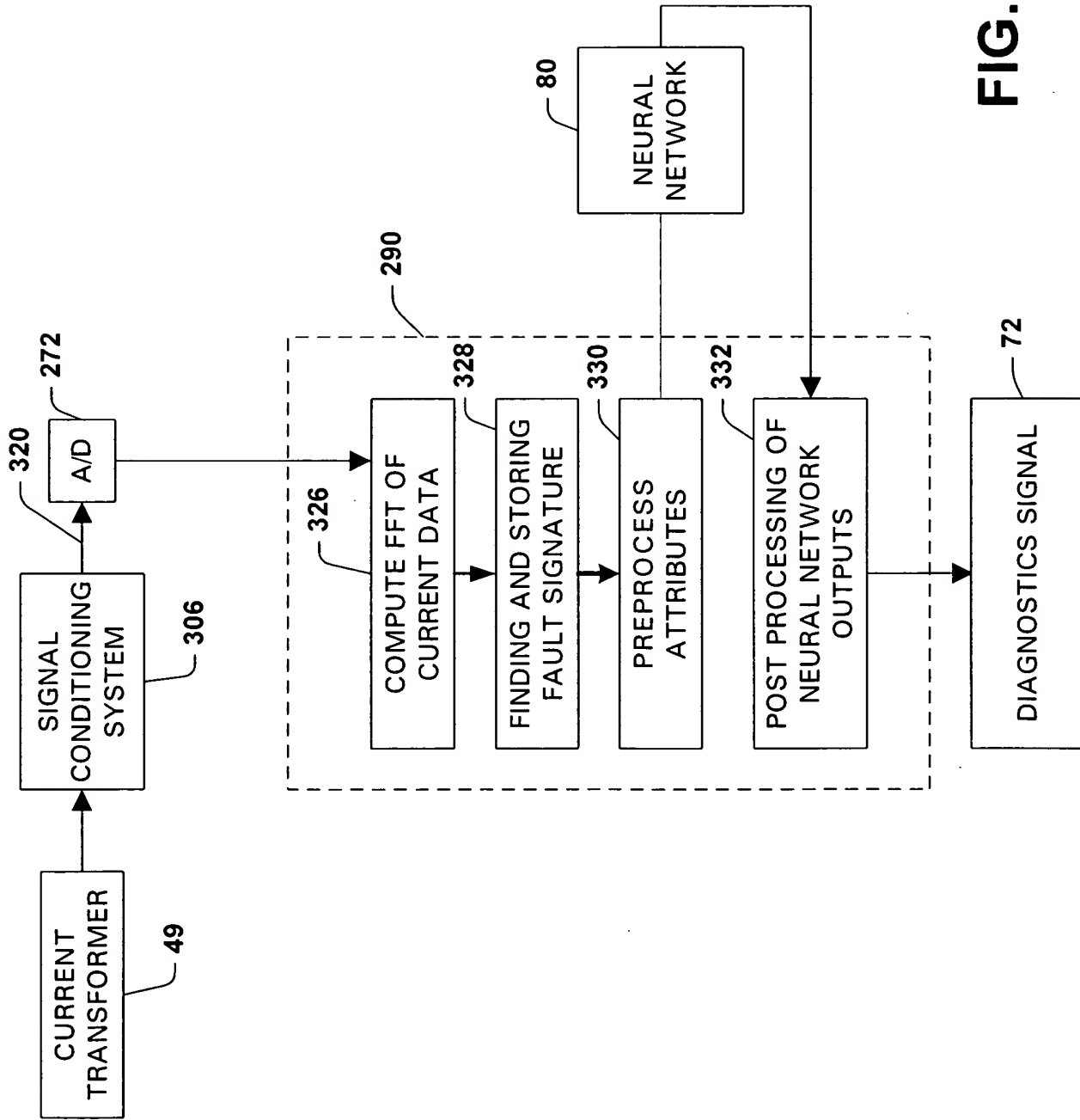


FIG. 11

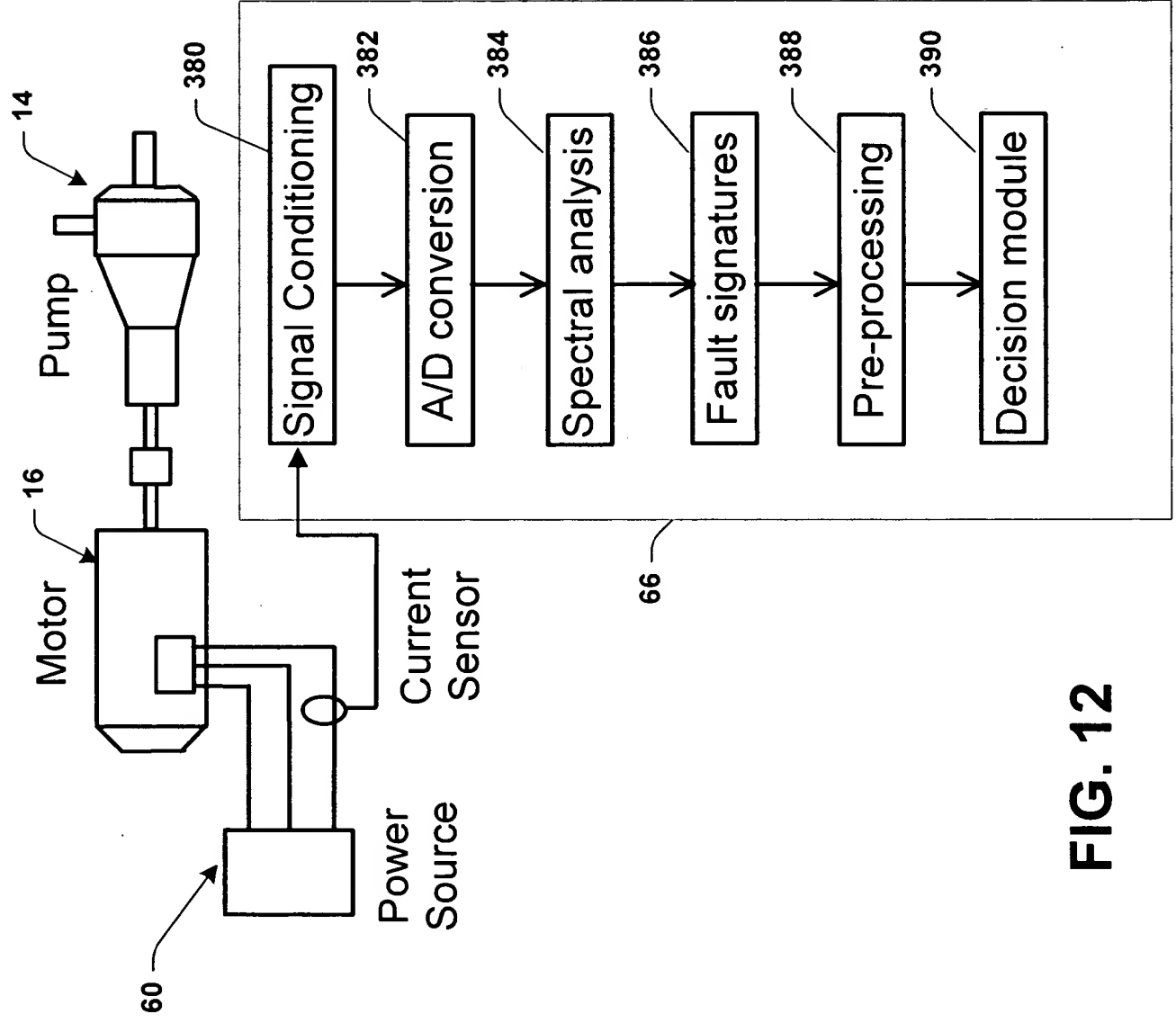


FIG. 12

326

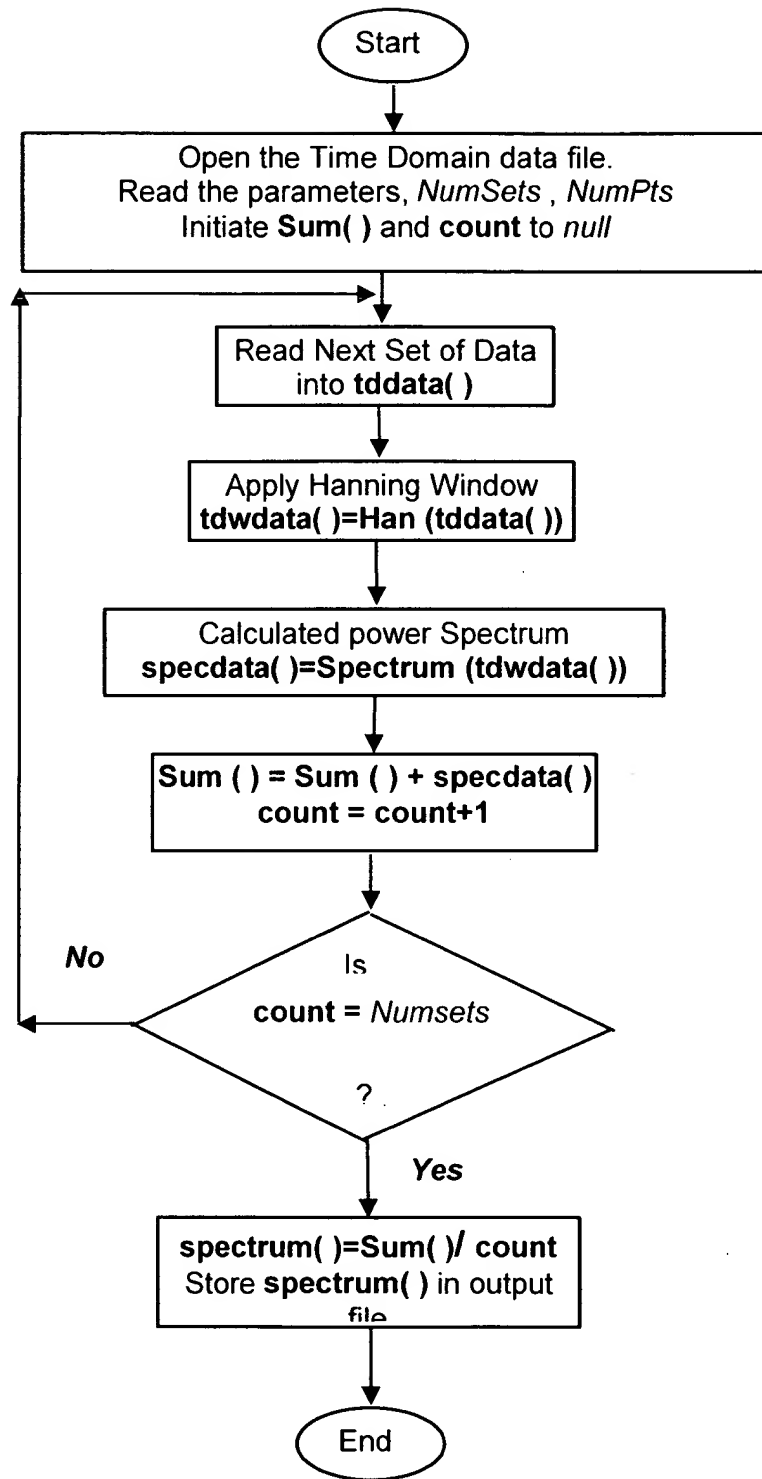


FIG. 13

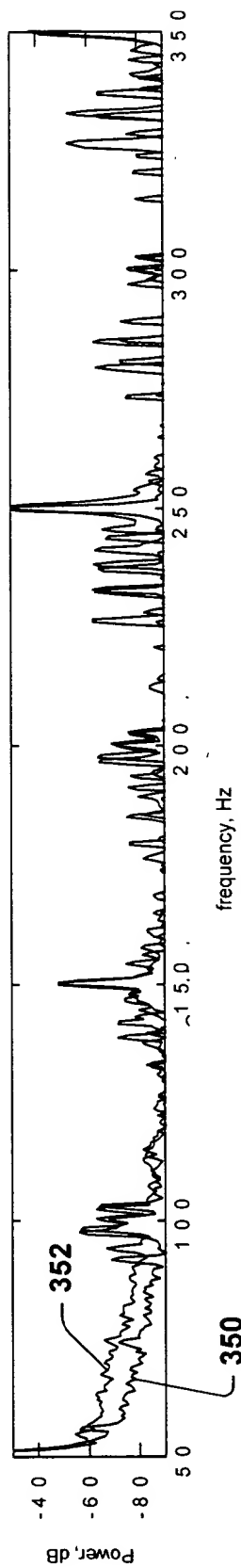


Fig. 14a

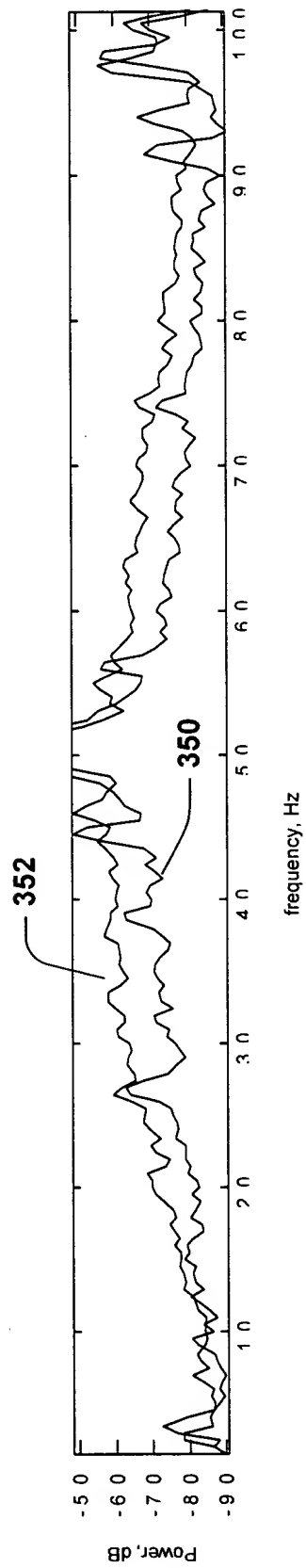


Fig. 14b

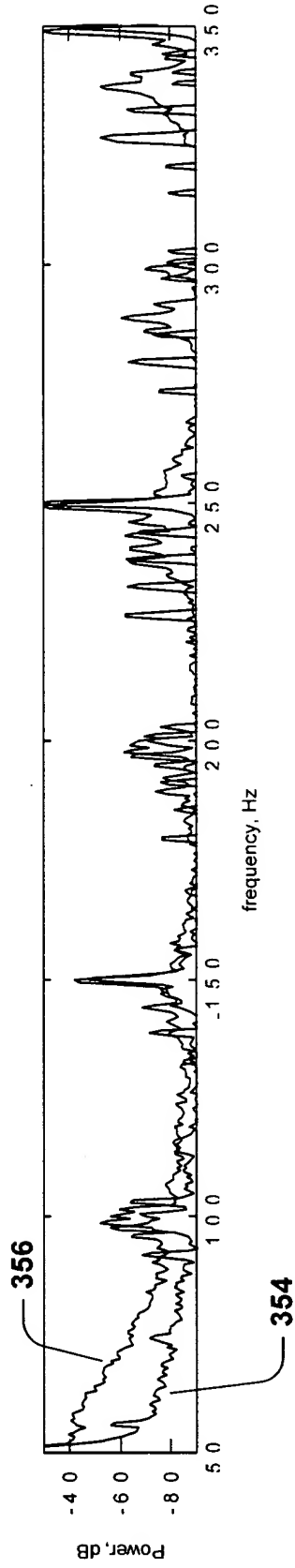


Fig. 14c

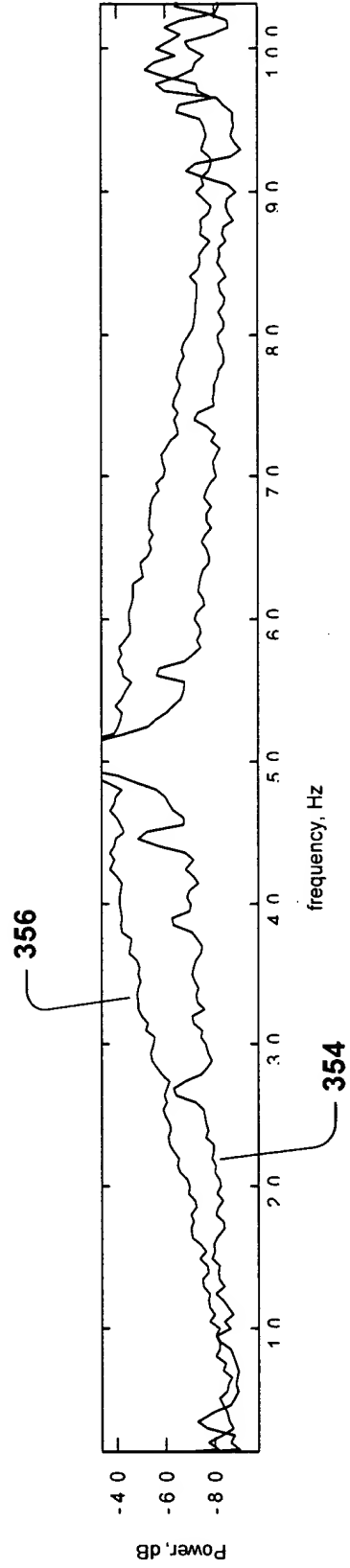


Fig. 14d

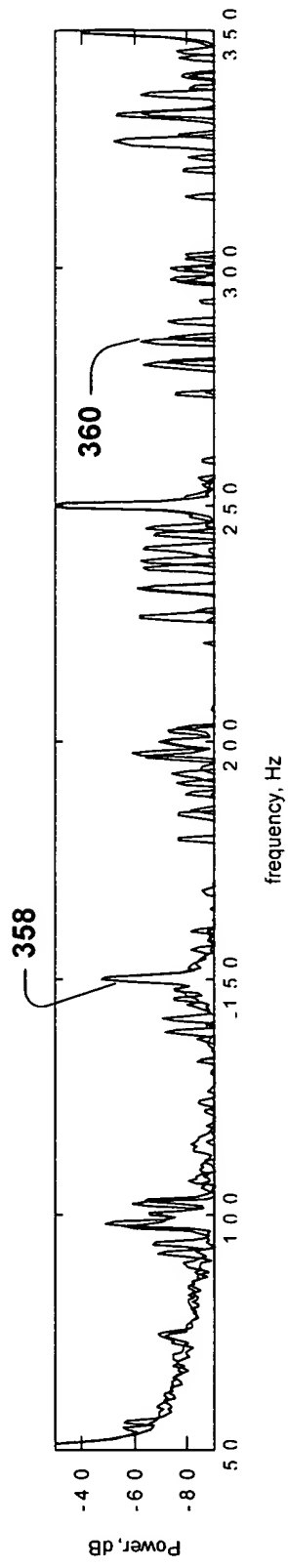


Fig. 14e

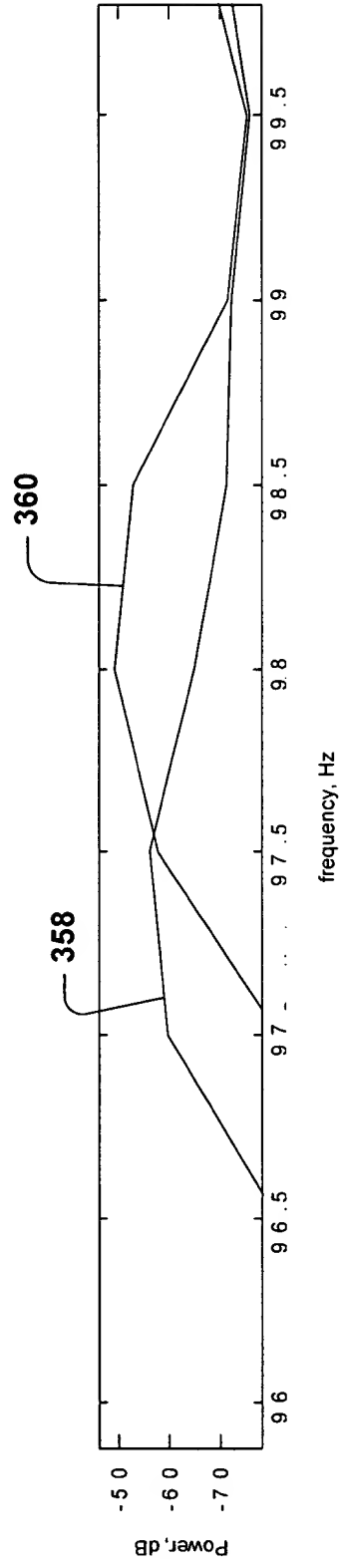


Fig. 14f

400

402

404

f_0	f_1	f_2	f_3	f_4	\bullet	\bullet	\bullet	f_n	
A_3	A_{34}	A_{67}	A_{78}	A_{84}	\bullet	\bullet	\bullet	A_K	HEALTHY PUMP
A_{34}	A_{68}	A_{90}	A_{65}	A_{45}	\bullet	\bullet	\bullet	A_H	PUMP FAULT 1
A_{56}	A_{45}	A_{45}	A_{56}	A_{78}	\bullet	\bullet	\bullet	A_X	PUMP FAULT 2
A_{23}	A_{45}	A_7	A_{90}	A_{12}	\bullet	\bullet	\bullet	A_Z	PUMP FAULT 3
A_{67}	A_{36}	A_3	A_{45}	A_{47}	\bullet	\bullet	\bullet	A_X	PUMP FAULT 4
A_{78}	A_{67}	A_{12}	A_{67}	A_{37}	\bullet	\bullet	\bullet	A_C	PUMP FAULT 5
A_{234}	A_{27}	A_{478}	A_{24}	A_{127}	\bullet	\bullet	\bullet	A_Q	PUMP FAULT 6
A_{98}	A_{78}	A_{26}	A_{12}	A_{128}	\bullet	\bullet	\bullet	A_B	PUMP FAULT 7
A_{26}	A_{96}	A_{83}	A_{56}	A_{234}	\bullet	\bullet	\bullet	A_M	PUMP FAULT 8
A_4	A_{32}	A_{187}	A_{56}	A_{34}	\bullet	\bullet	\bullet	A_I	PUMP FAULT 9
A_0	A_{16}	A_{73}	A_{76}	A_{33}	\bullet	\bullet	\bullet	A_E	PUMP FAULT N-1
A_{75}	A_{17}	A_{45}	A_{69}	A_{44}	\bullet	\bullet	\bullet	A_Q	PUMP FAULT N

FIG. 14g

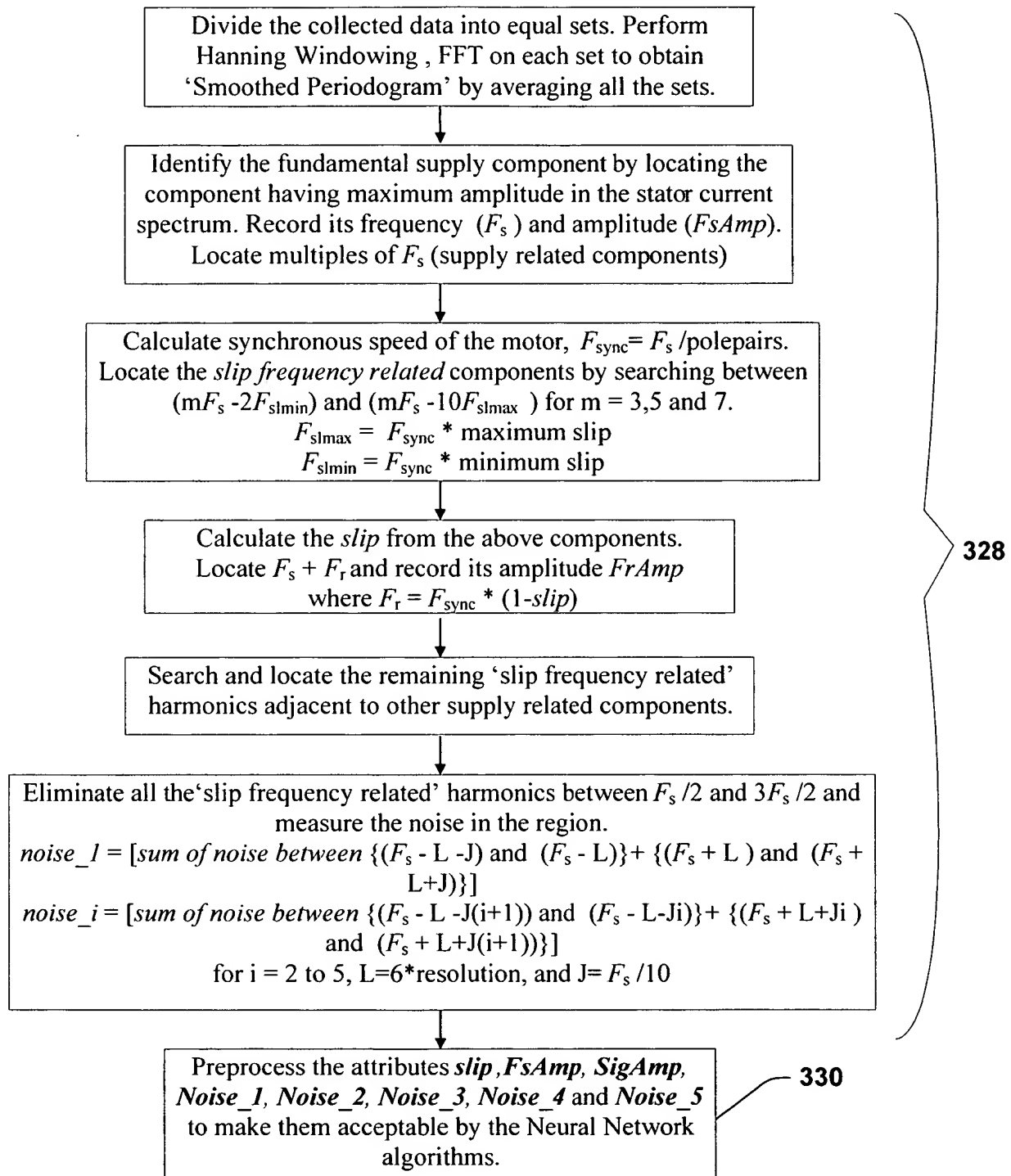


FIG. 15

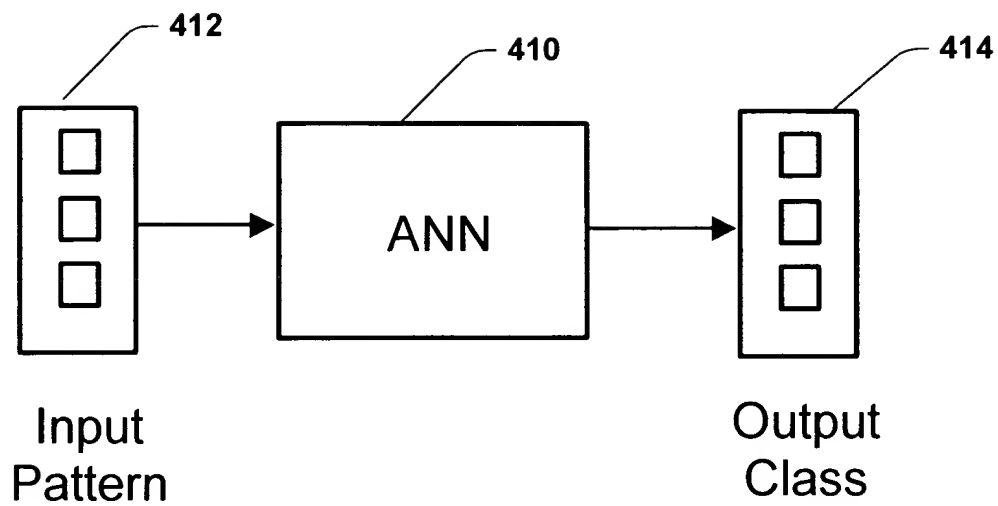


Fig. 16

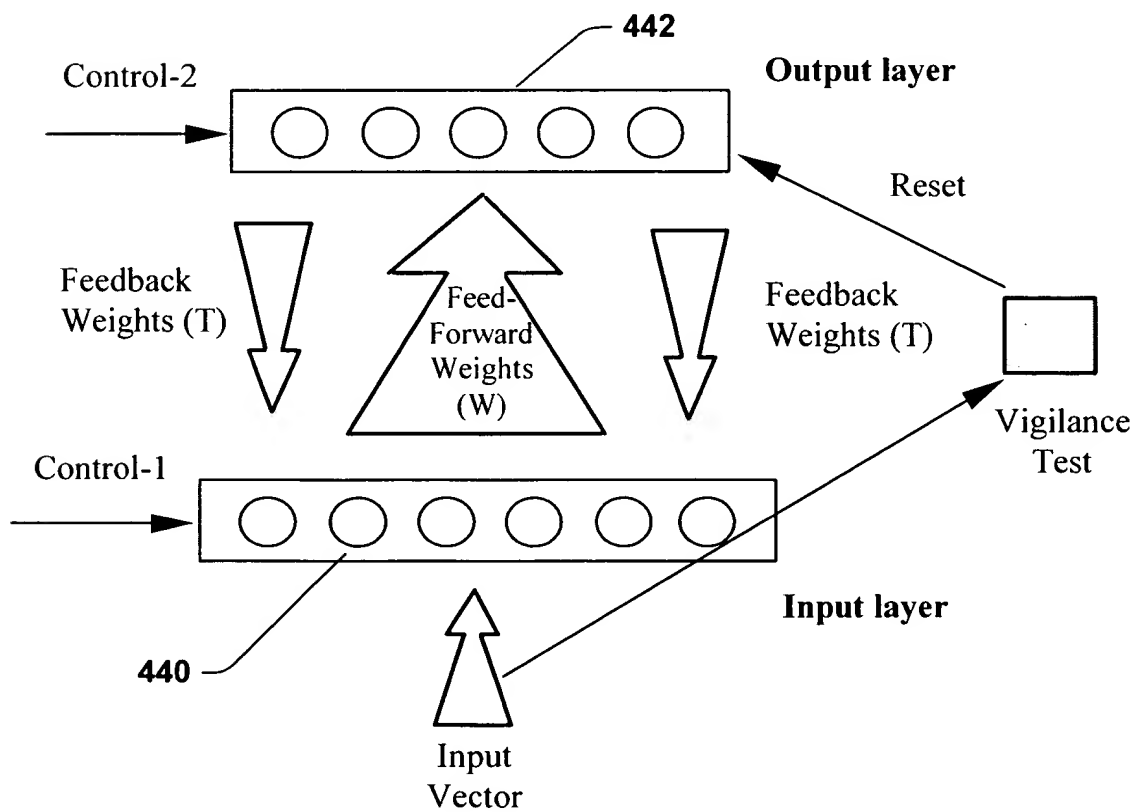


Fig. 17

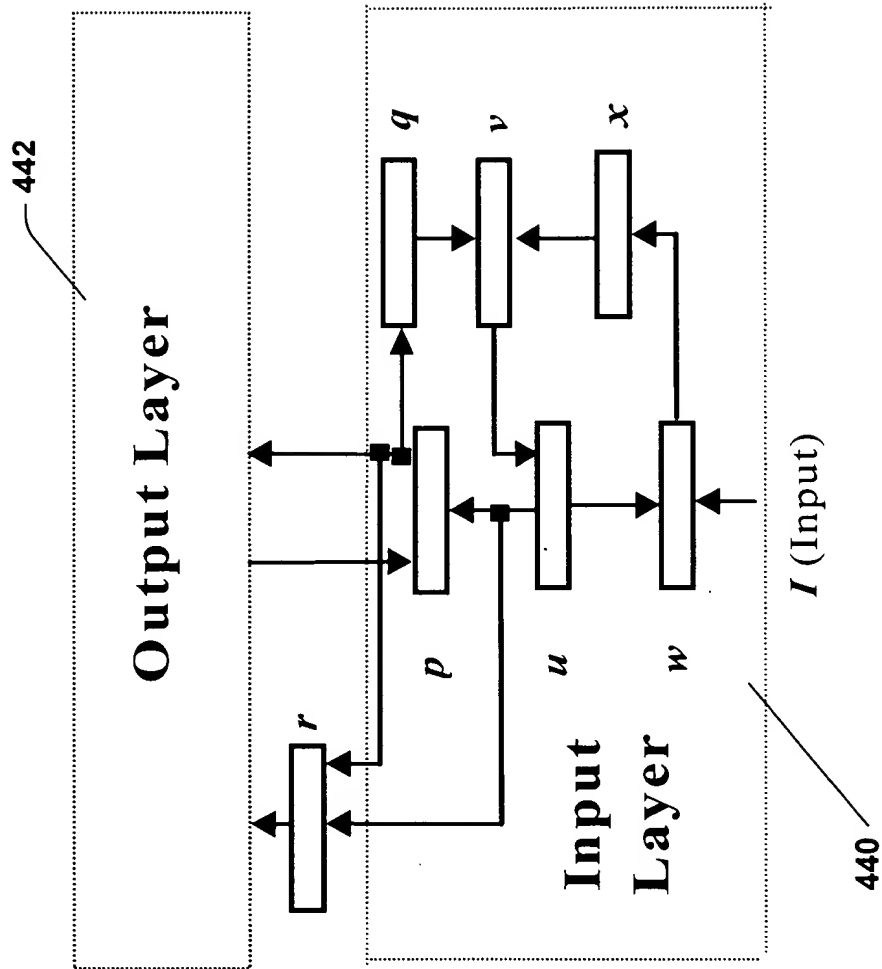


Fig. 18

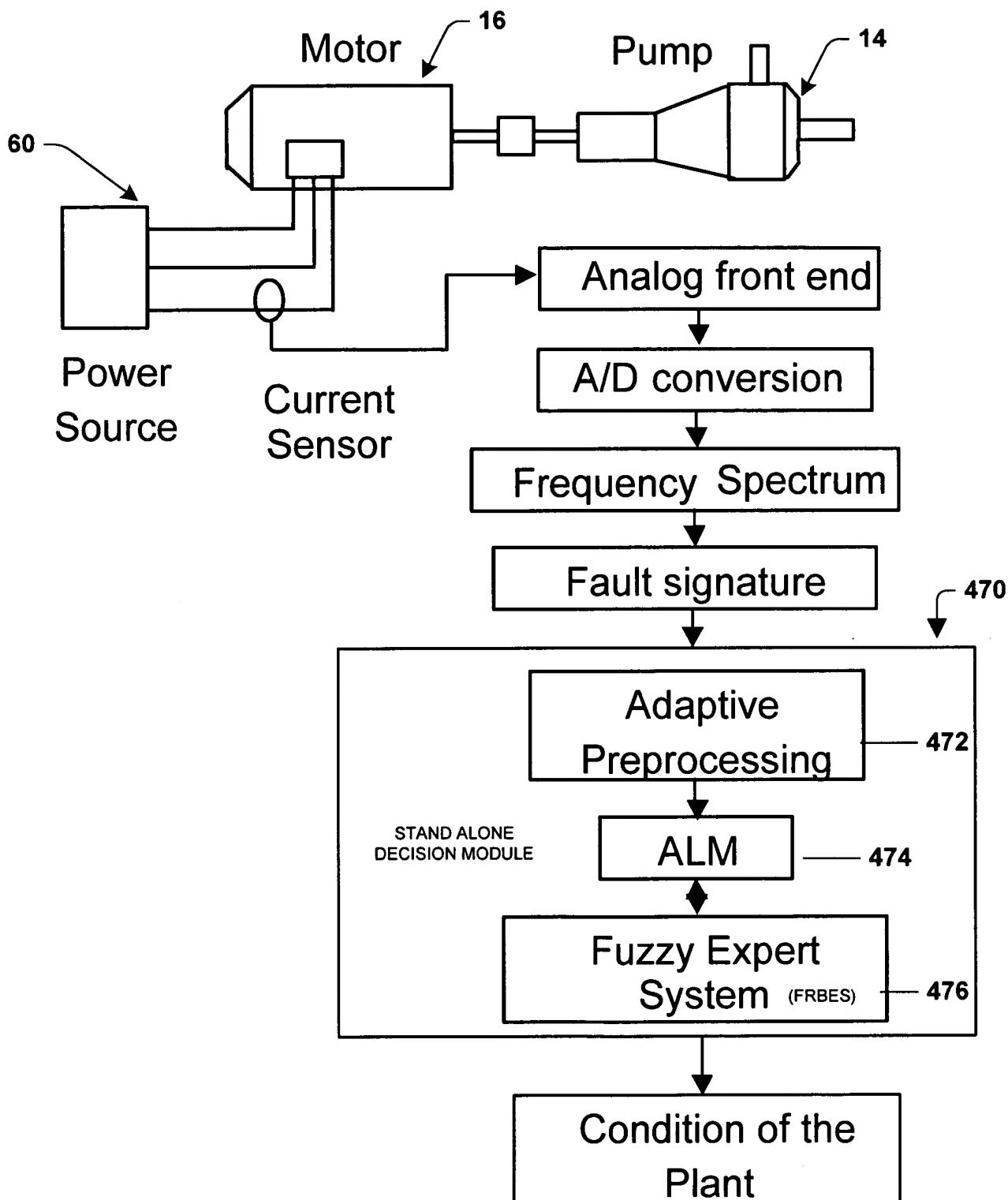


Fig. 19

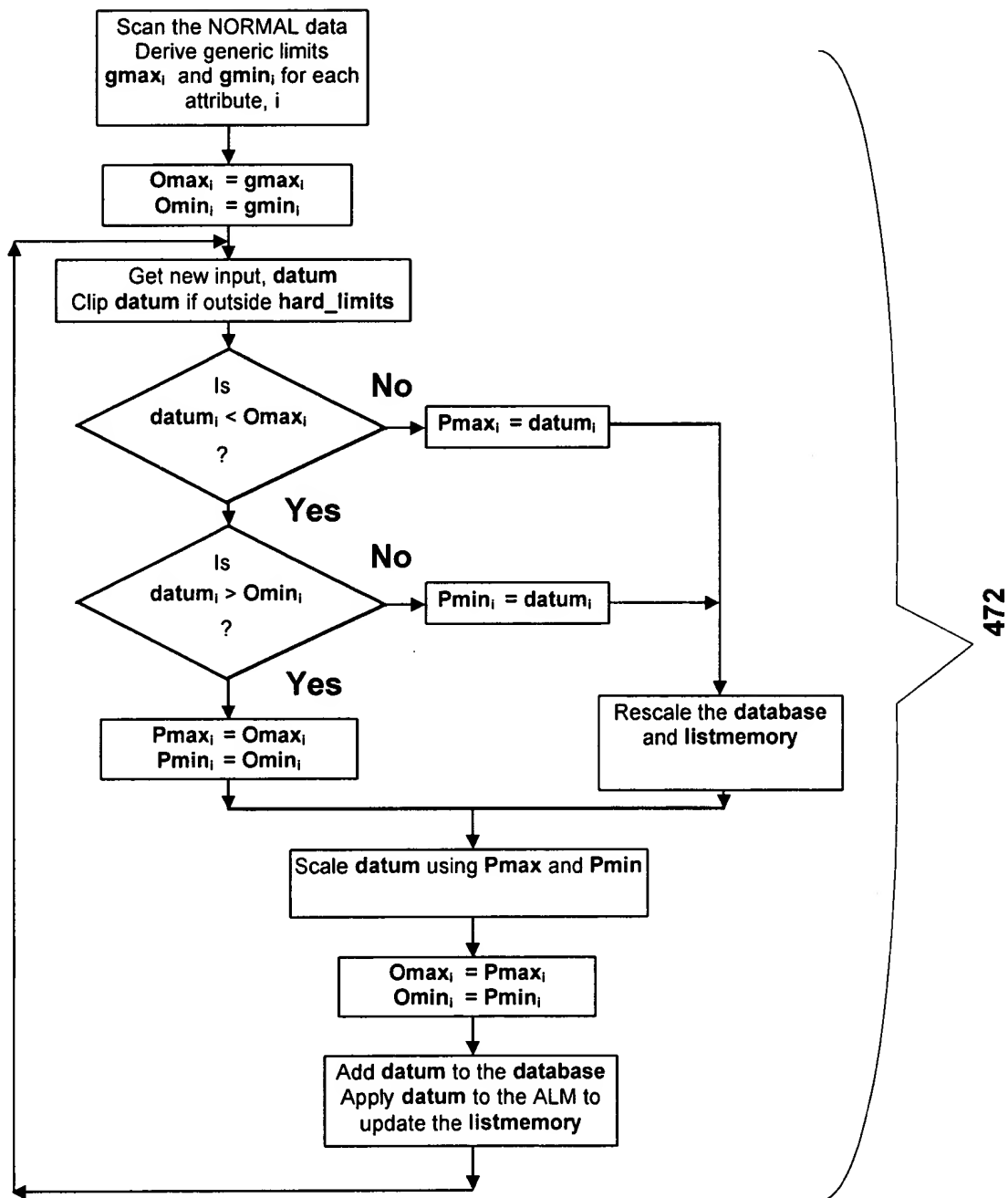


Fig. 20

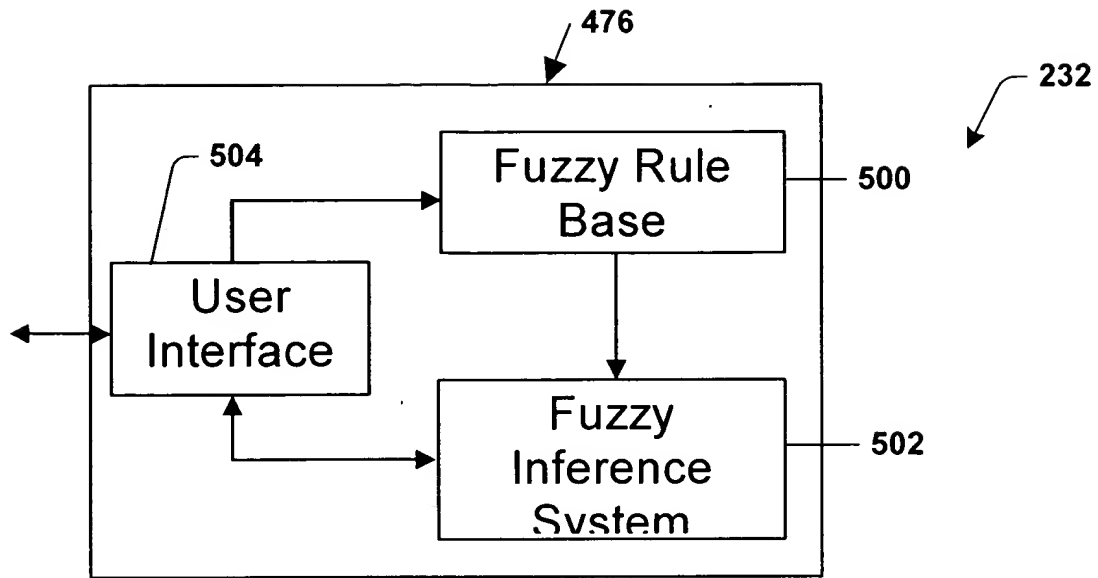


Fig. 21

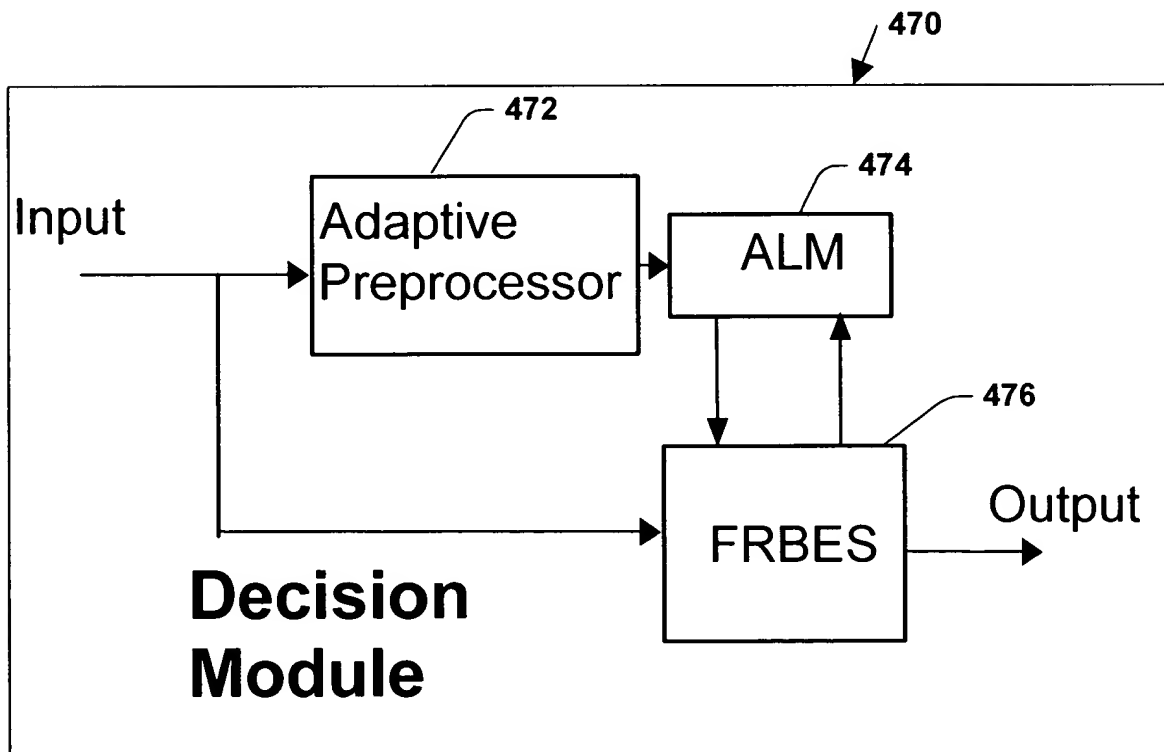


Fig. 22


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IF all the attributes are NORMAL THEN condition is normal
IF slip is SLLO and noise_2 is HI THEN condition is low-cav
IF noise_4 and noise_5 are VERHI THEN condition is sev-cav
  IF noise_4 and noise_5 are HI THEN condition is sev-cav
IF FsAmp is SLLO and noise_5 are SLHI THEN condition is sev-cav
  IF FsAmp is LO and noise_5 is SLHI THEN condition is sev-cav
IF FsAmp is VERLO and noise_5 is SLHI THEN condition is sev-cav
  IF FsAmp is SLLO and noise_4 are HI THEN condition is sev-cav
    IF FsAmp is LO and noise_4 is HI THEN condition is sev-cav
    IF FsAmp is LO and noise_4 is VERHI THEN condition is sev-cav
IF FsAmp is SLLO and slip is SLLO and noise_4 is NORMAL and noise_5 is NORMAL THEN condition is low-
  block
IF FsAmp is LO and noise_4 is NORMAL and noise_5 is NORMAL THEN condition is sev-block
  IF slip and FsAmp are VERLO THEN condition is sev-block
    IF FsAmp is HI THEN condition is impel-fault
    IF framp is VERHI THEN condition is impel-fault
  
```

Fig. 23

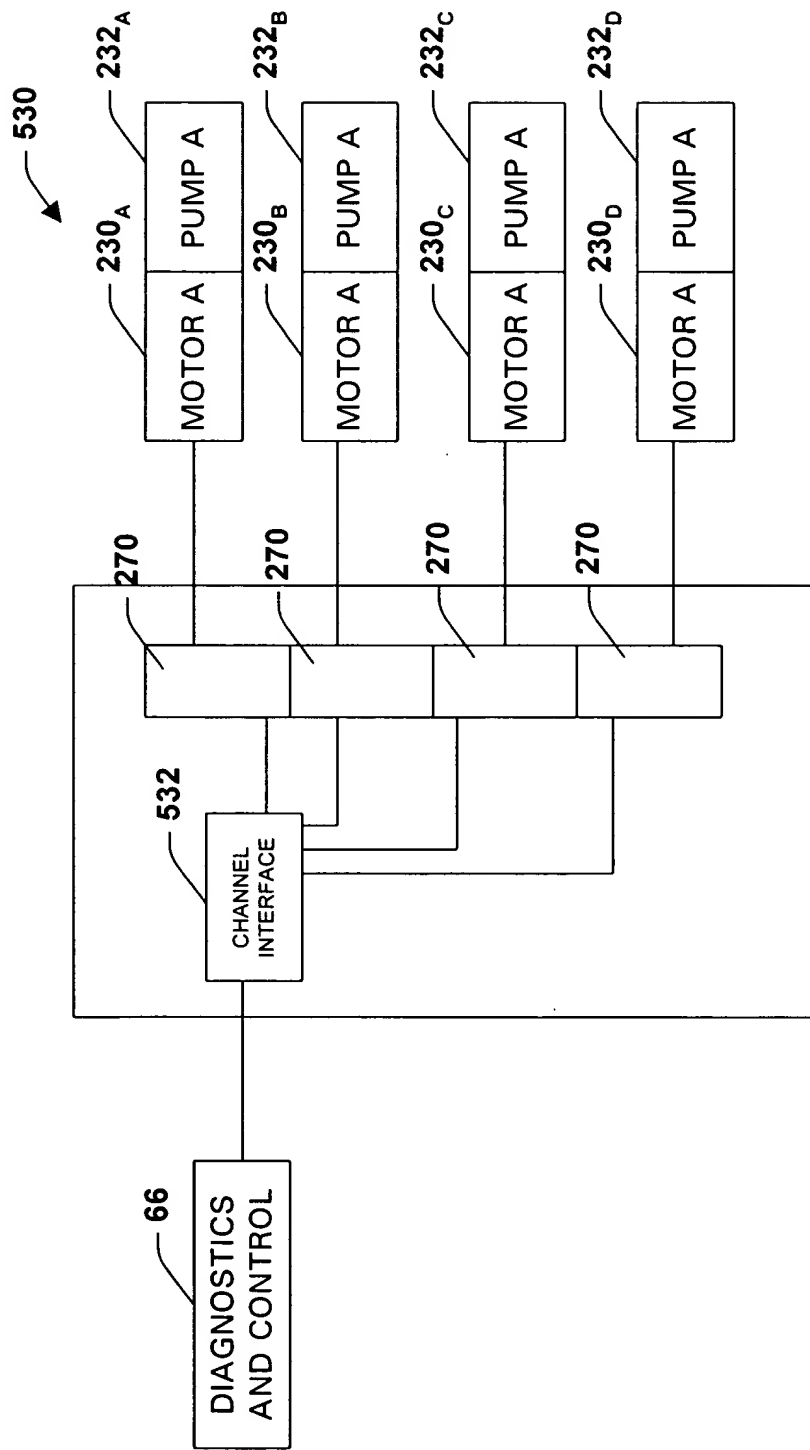


Fig. 24

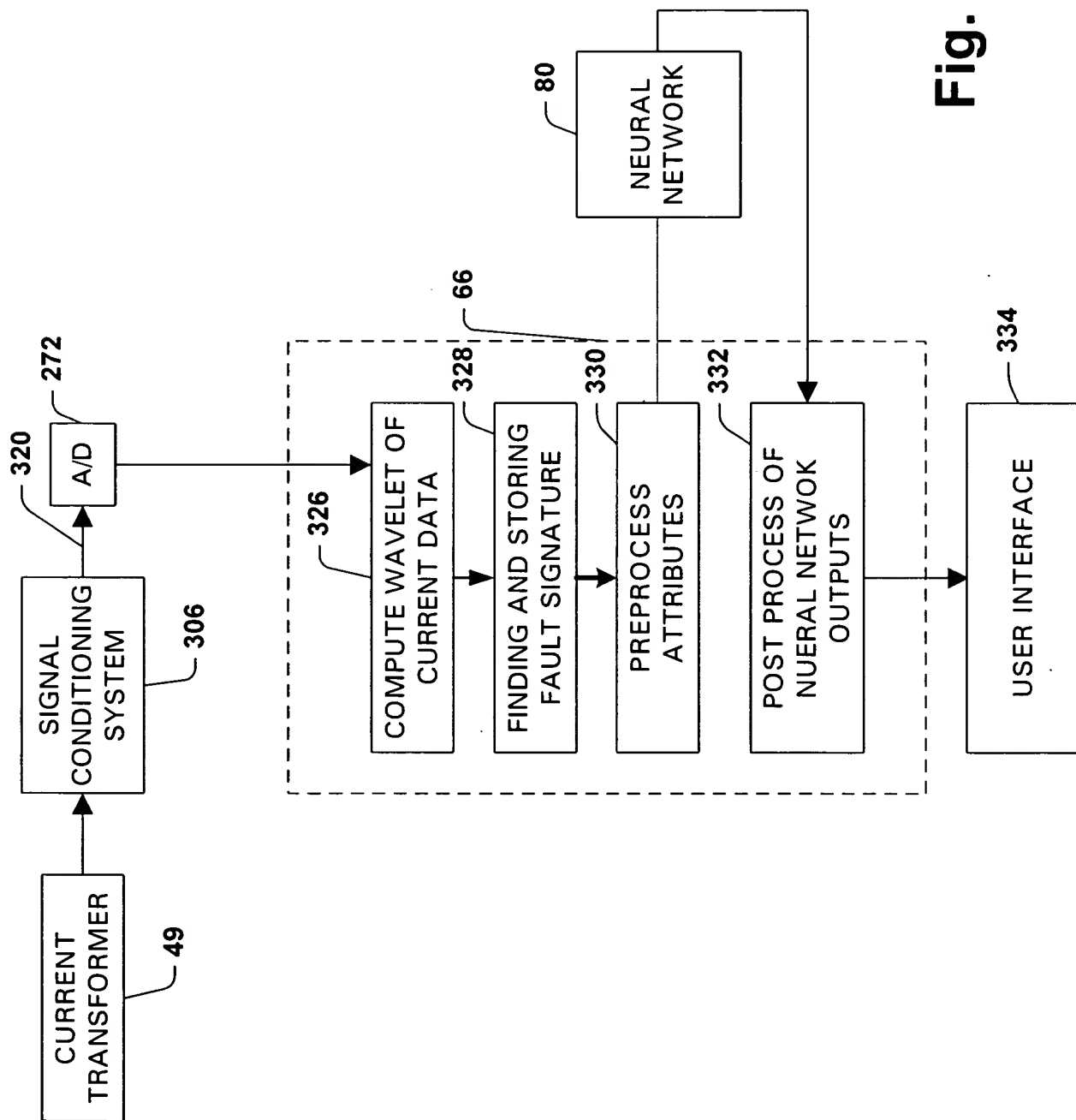


Fig. 25

600

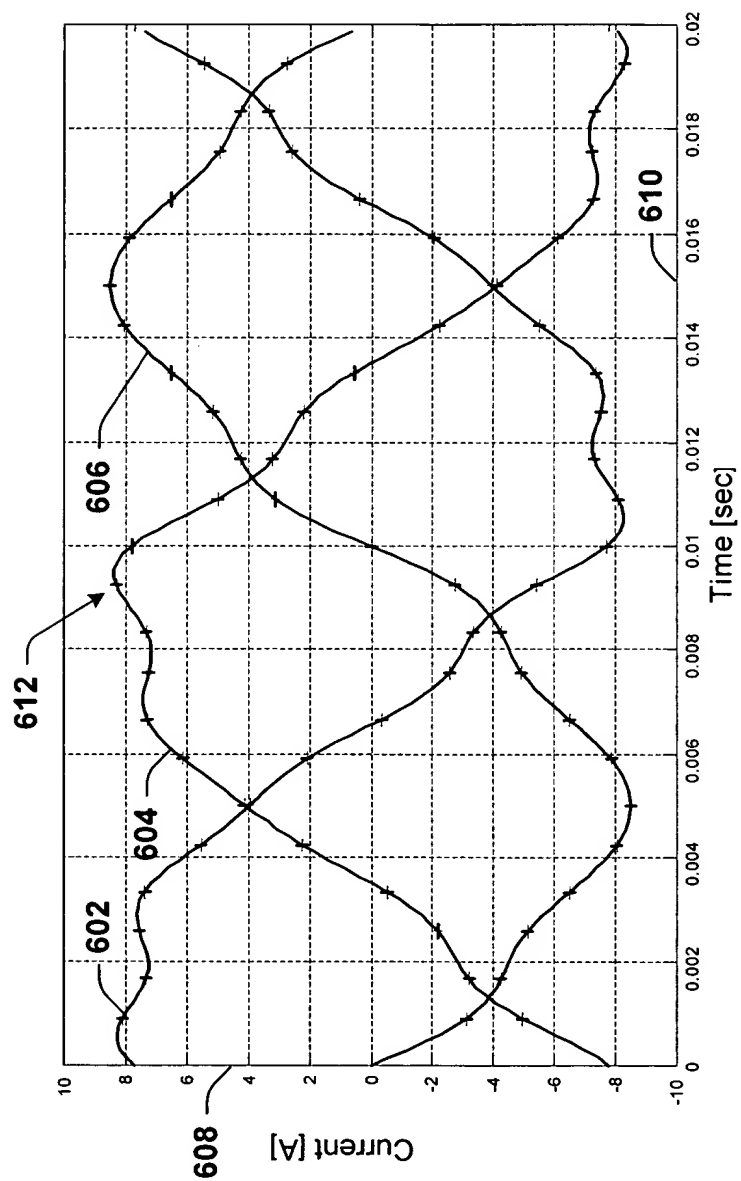


FIG. 26

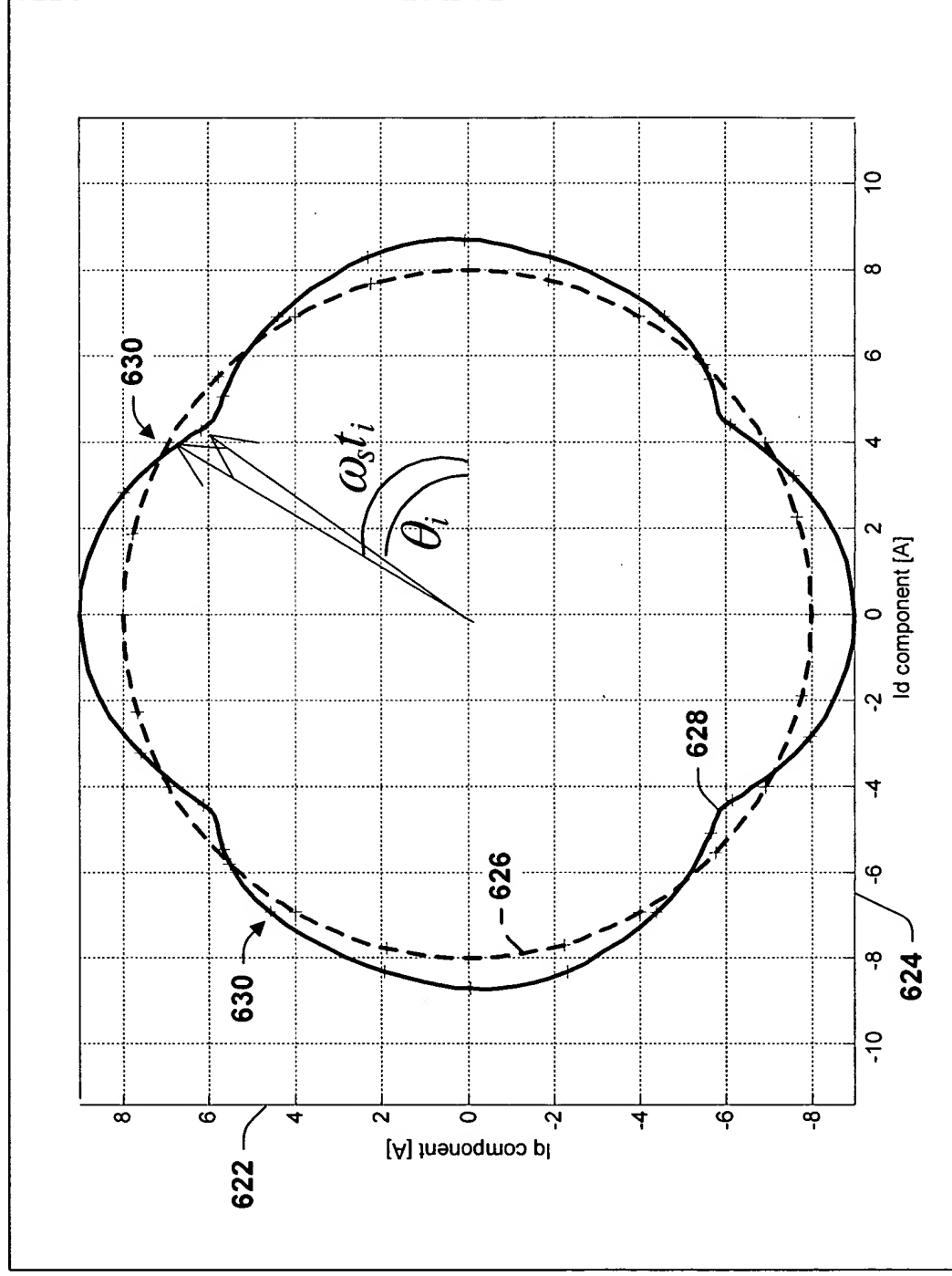


FIG. 27

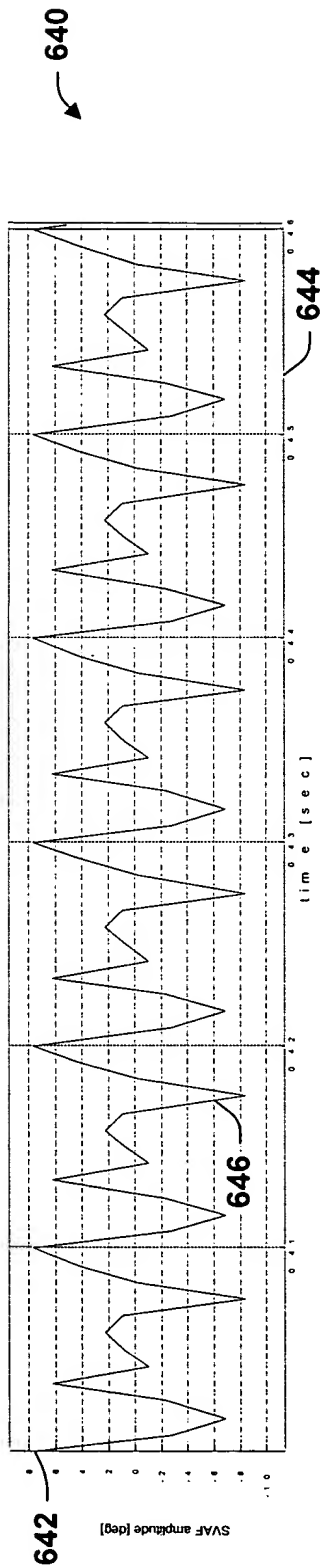


FIG. 28

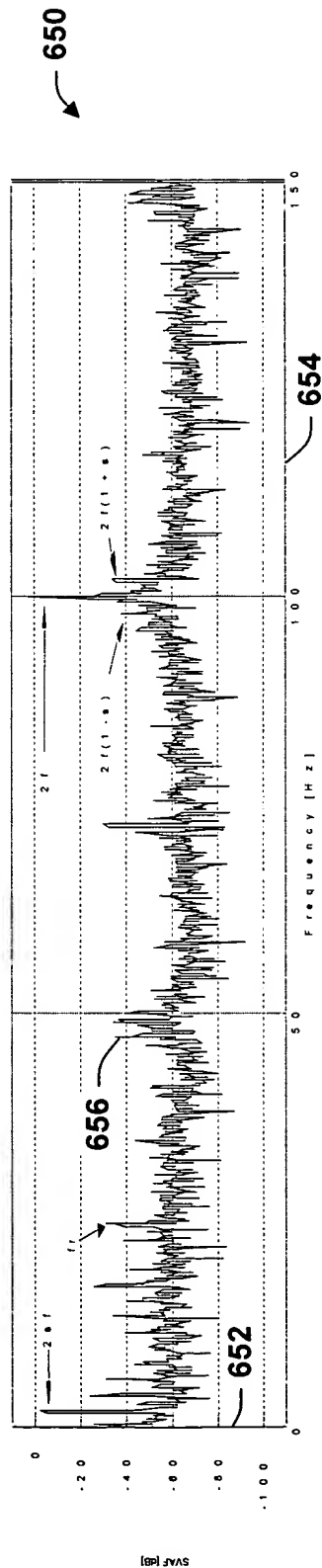


FIG. 29

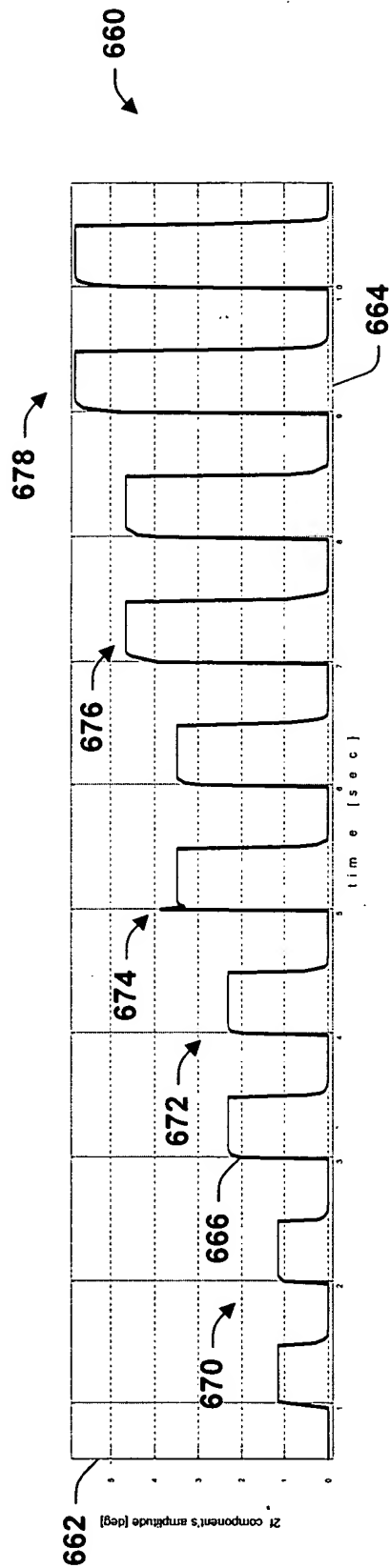


FIG. 30

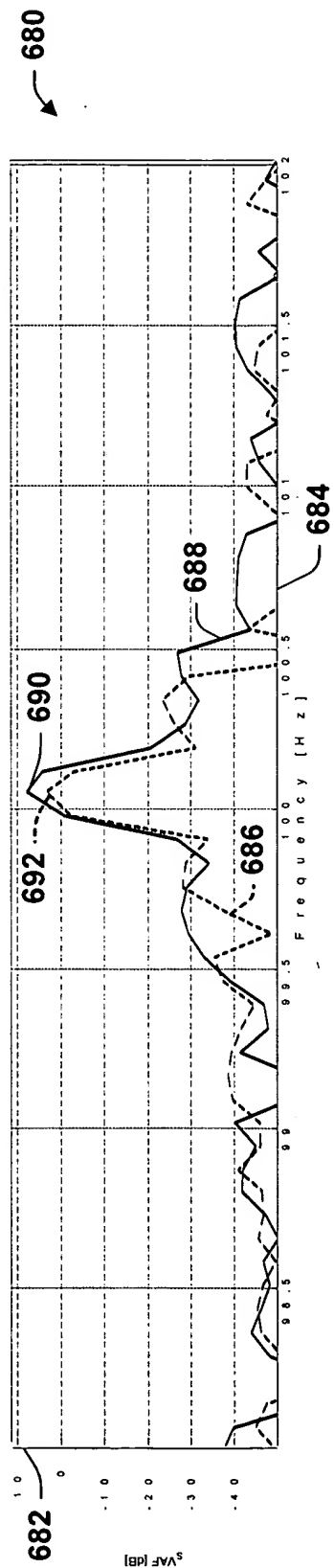


FIG. 31

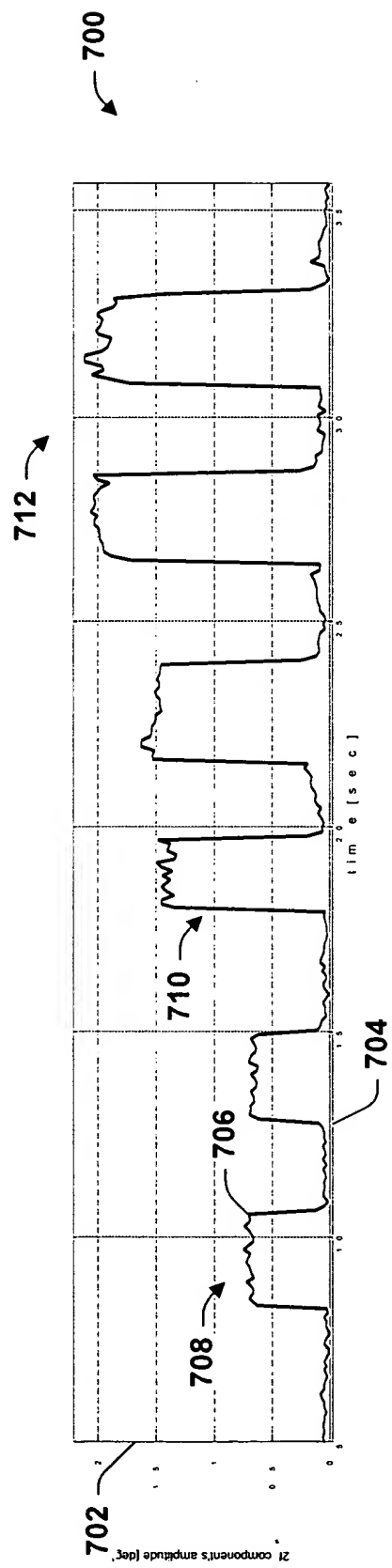


FIG. 32

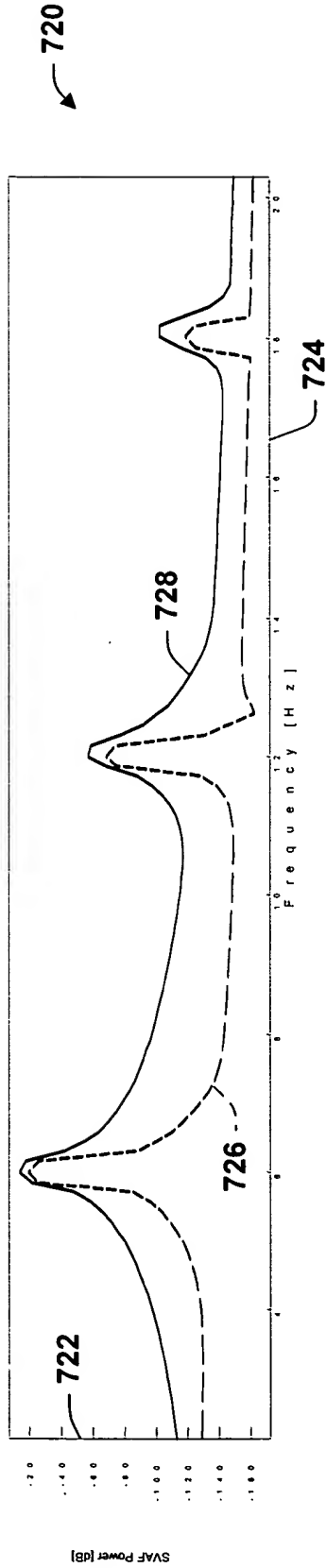


FIG. 33

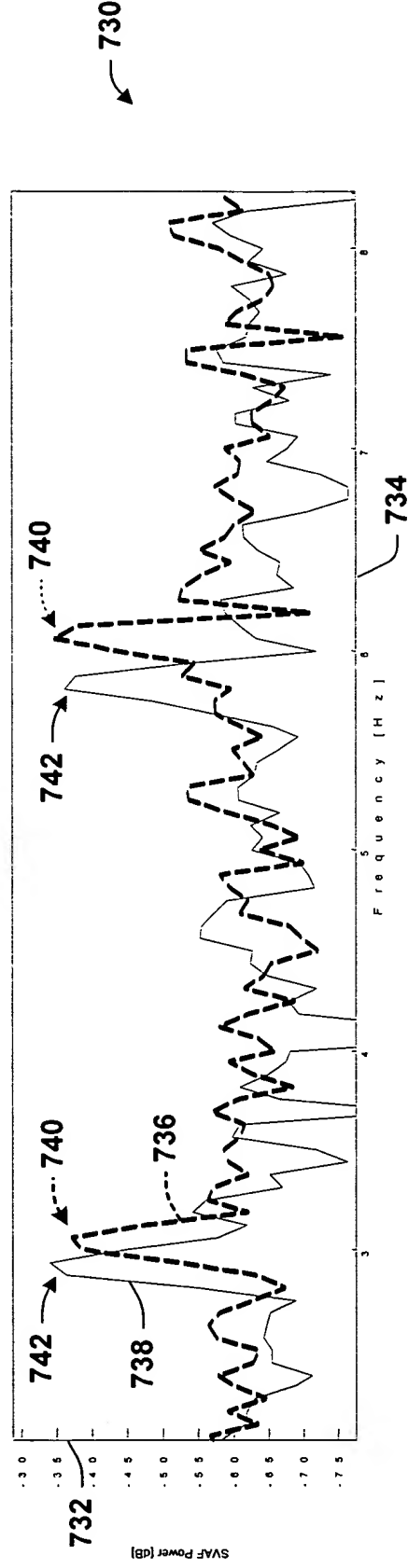


FIG. 34

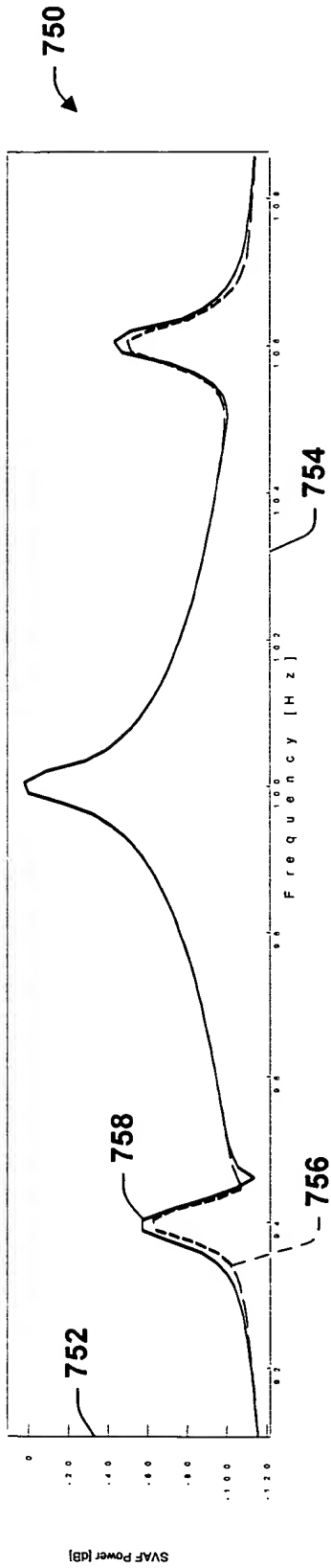


FIG. 35

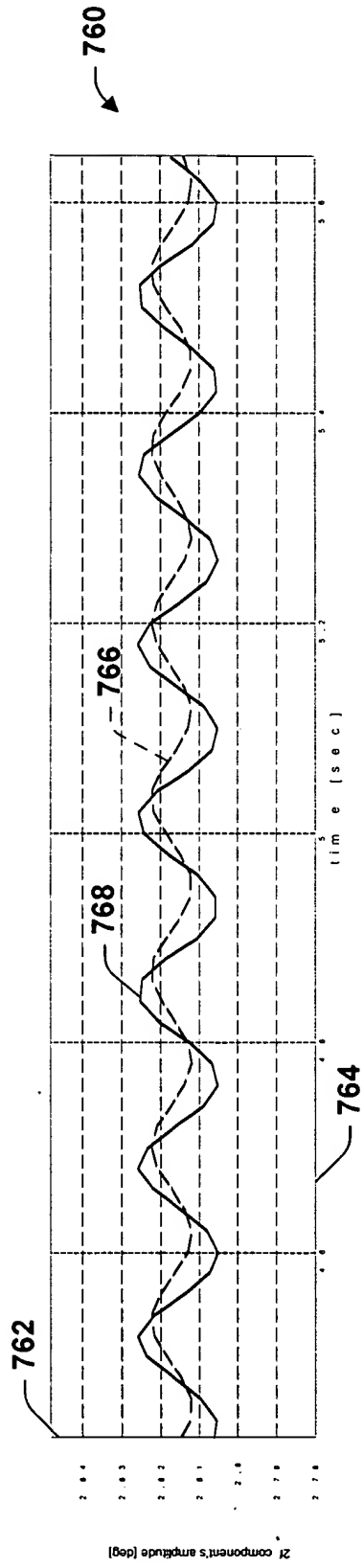


FIG. 36

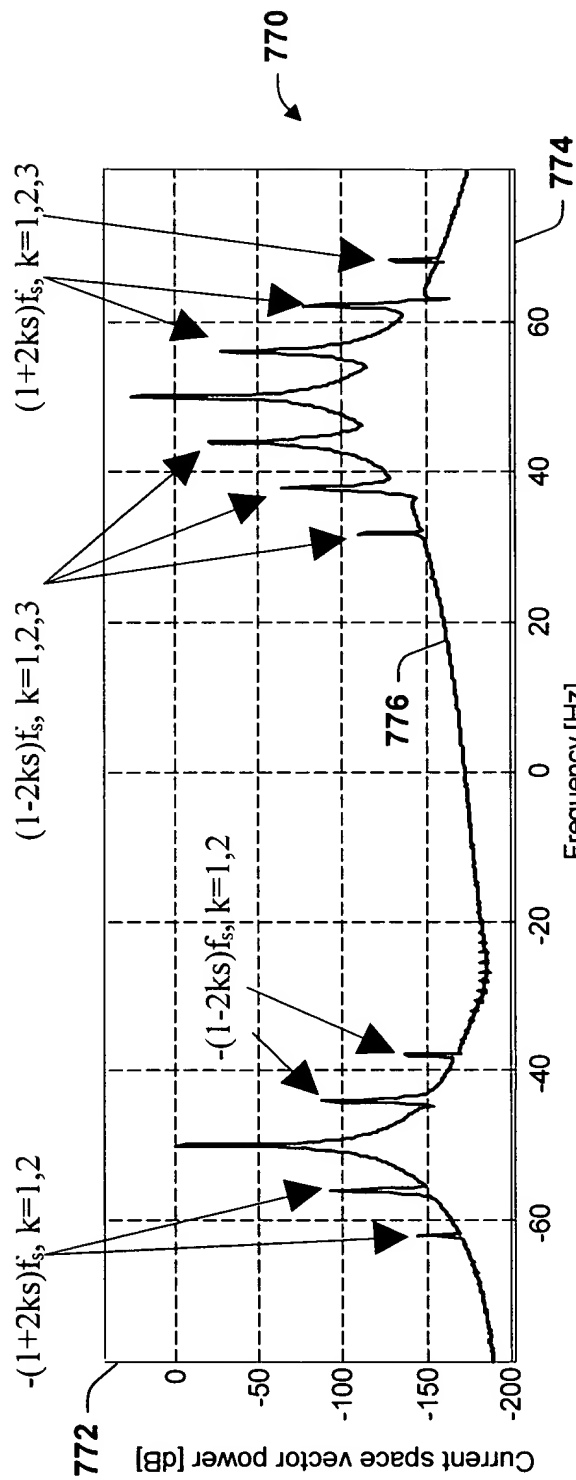


FIG. 37

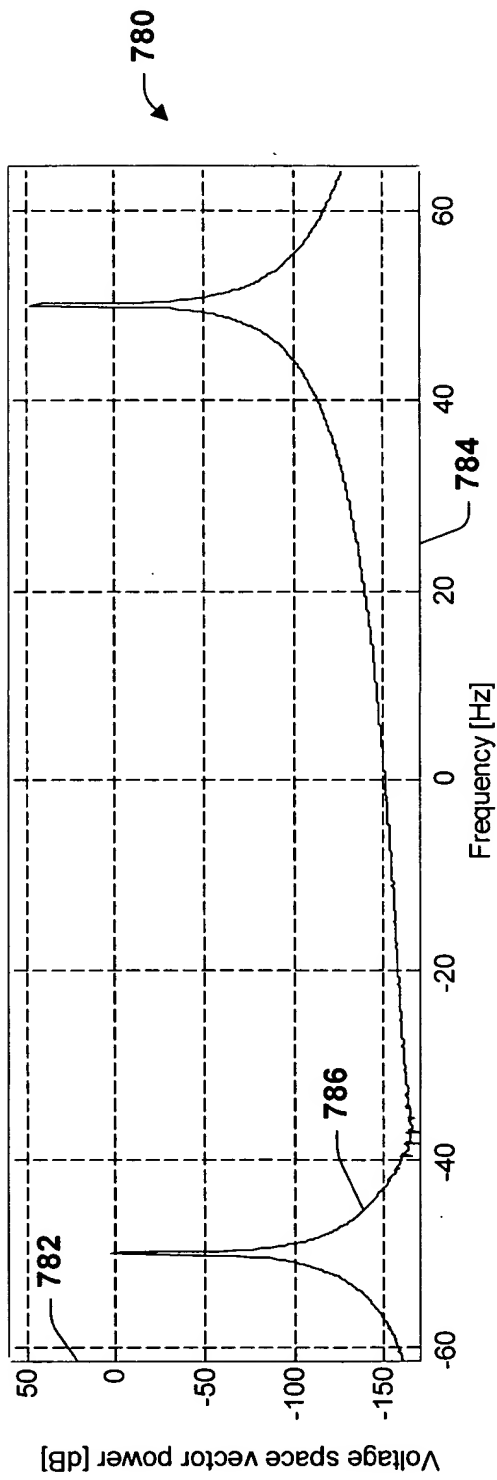


FIG. 38

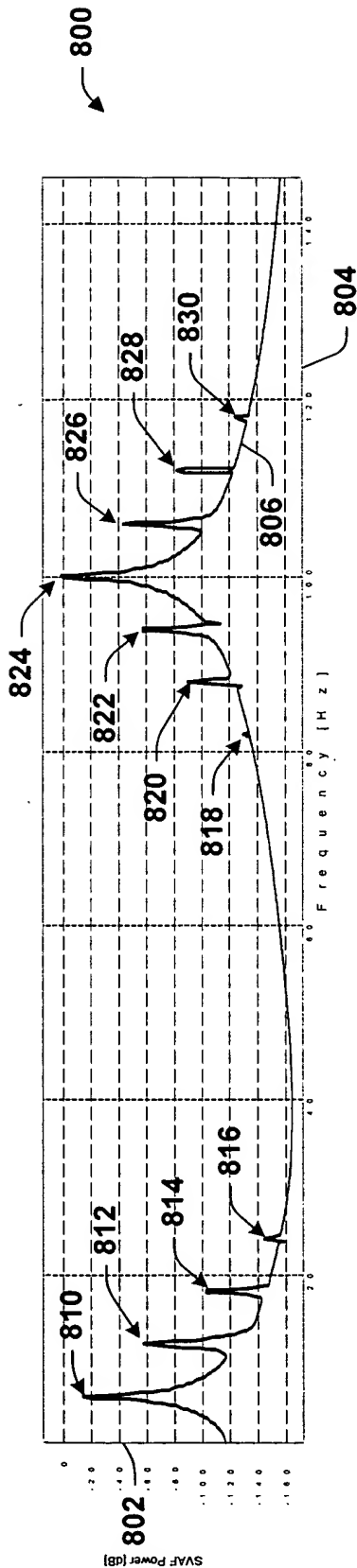


FIG. 39

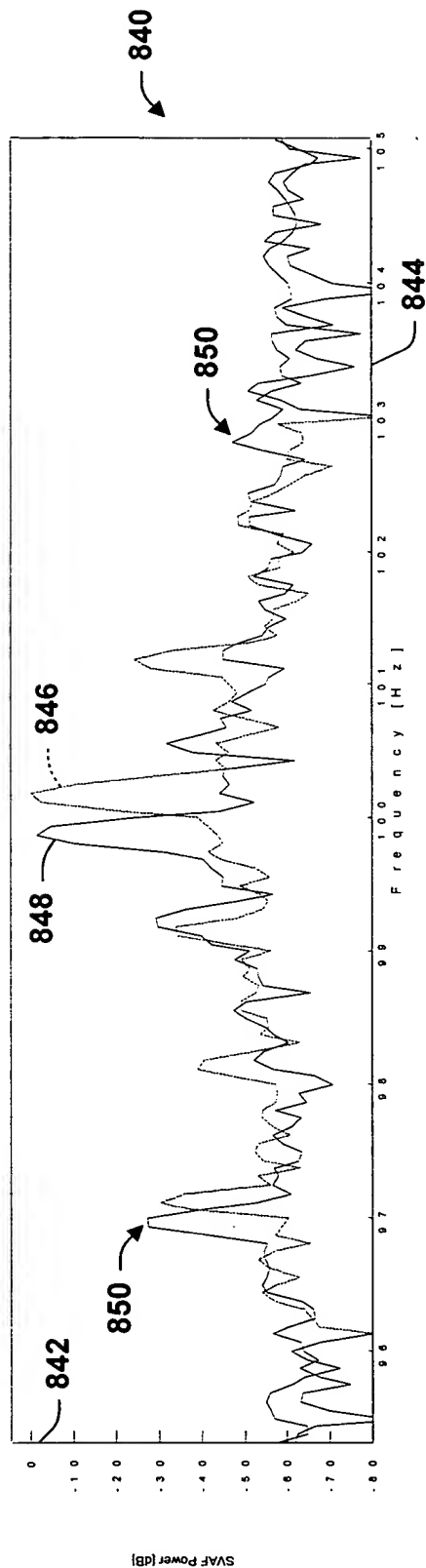


FIG. 40

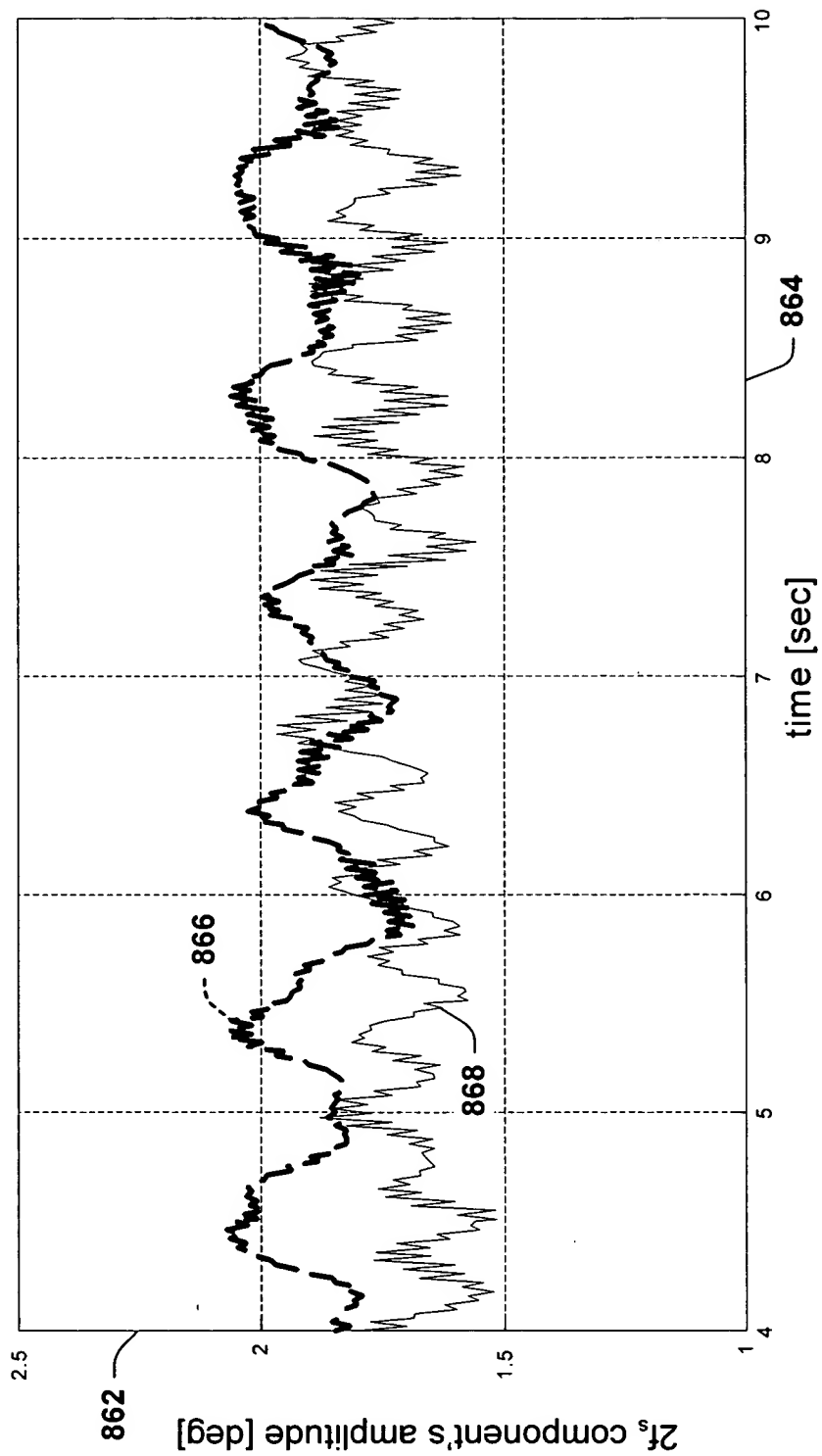


FIG. 41

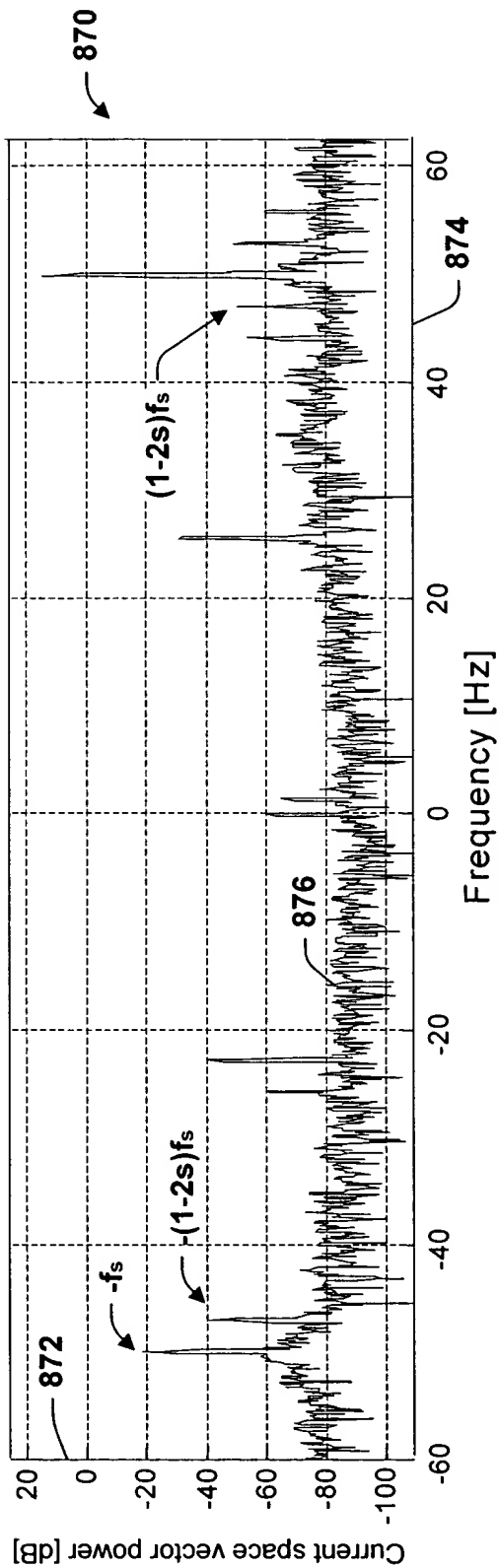


FIG. 42

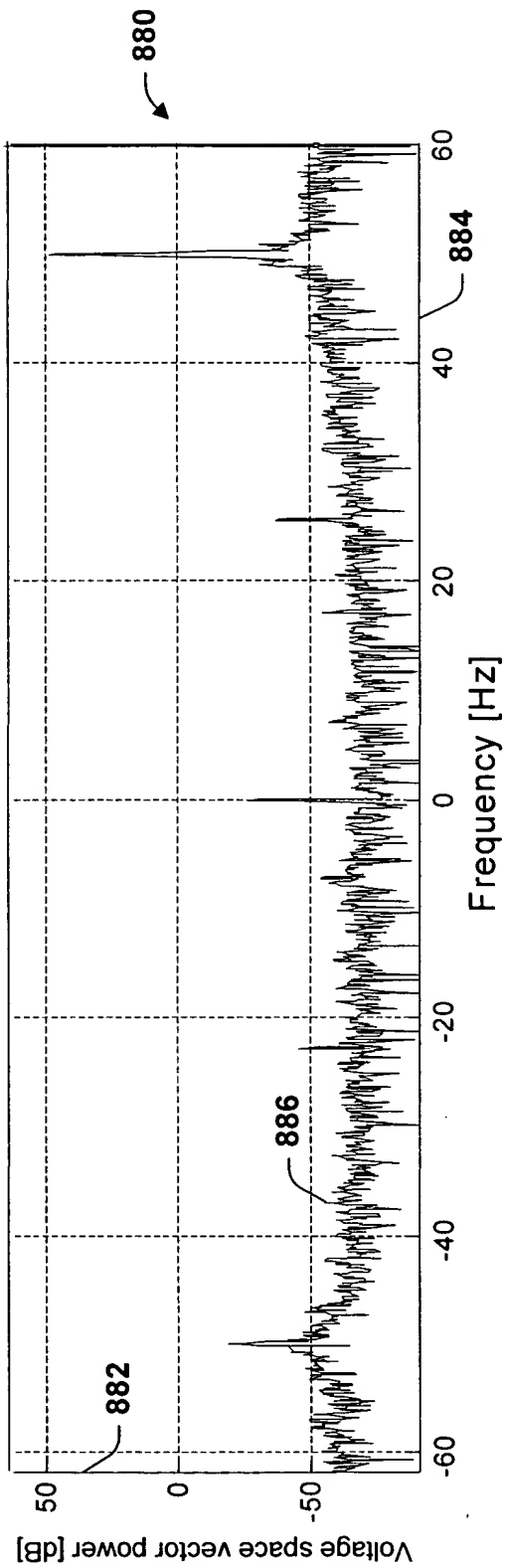


FIG. 43

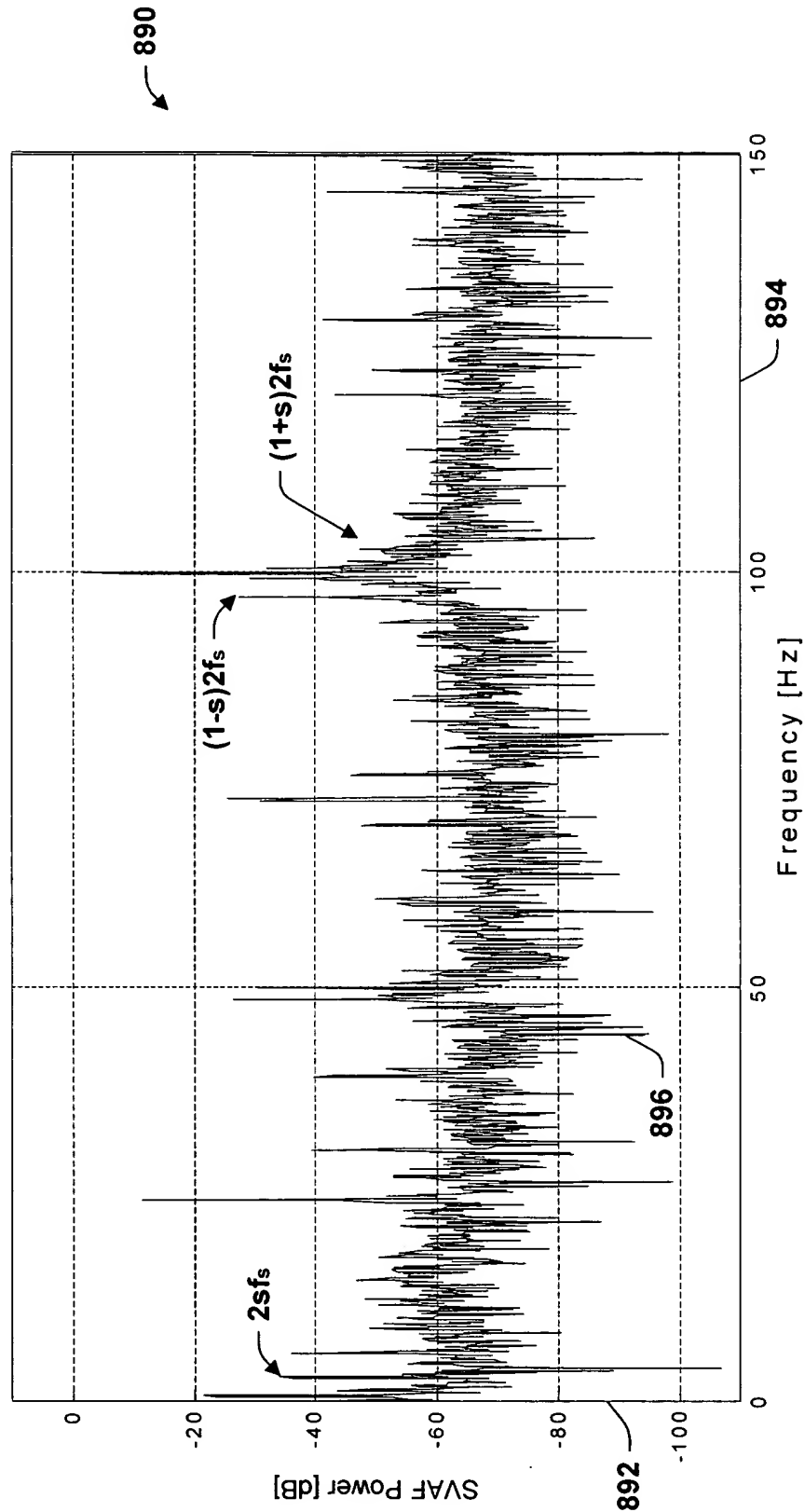


FIG. 44